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MARKETDATA ENTERPRISES
A Full-Service Industrial Research Company

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THE U.S. ELECTRONIC CONNECTORS INDUSTRY:

A MARKETING, ECONOMIC, FINANCIAL, AND TECHNOLOGICAL INVESTIGATION

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THE UNITED STATES ELECTRONIC CONNECTORS INDUSTRY

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INTRODUCTION

Marketdata has prepared the following industry study with the manufacturer, consultant, and industry analyst fully in mind. We have selected only the most current and pertinent data, particular to this industry only, wherever possible. A good deal of the statistical information contained in the report was obtained from Government sources much as the Census of Manufacturers, Current Industrial Reports, Department of Commerce, etc. Due to the vast amount of data collected by Government agencies, and the detailed reporting required, statistics are frequently several years old before being published. Bearing this in mind, Marketdata has estimated and forecasted current and future sales, as well as including a computer scan of other published forecasts and estimates from Trade journals and other organizations.

The reader will be able to utilize this report as an economic, marketing, and Technological guide to this industry, gaining insight to its growth, structure, problems, past performance and future prospects. It will provide a wide range of varied and comprehensive data, both qualitative and quantitative, for the first-time analyst or long-established manufacturer.

The Bureau of the Census, via its Standard Industrial Classification (SIC) System, assigns four-digit numerical codes to each manufacturing sector of the U.S. economy, enabling it to survey and collect information from producers. This results in the annual or quinennial publication of industry statistics covering the value of producer shipments of the product, plant operating costs, employment, productivity, value added, etc. This industry's SIC code happens to be 3678.

This "raw data" has been collected and analyzed in the following report in order to determine overall growth patterns,

identify various market segments, and calculate industry averages or "yardsticks" which the individual manufacturer in any given state can compare himself to.

All sales figures, actual, estimated and forecasted, represent sales volume at the MANUFACTURING LEVEL only. Final sales to end-users may be substantially higher as the product is moved through U.S. or foreign distributor and export channels, with accompanying mark-ups. Consequently, the true value of the market will probably be higher than stated in this report. The reader will no doubt find different estimates of market size when consulting different sources, such as those included in the computer abstracts section.

Marketdata's purpose in preparing this report is to bring together in a single report the most important, most relevant, most current, yet comprehensive collection of information pertaining to the industry as possible. We have included original analyses of publically available information in the hope of spurring the manufacturer or consultant to view the industry in a light he/she has never viewed it previously. We encourage the reader to use the report actively, as an analytical and planning tool, as well as an industry database of useful information.

REPORT SCOPE ENCOMPASSES THE FOLLOWING:

1. The Market: U.S. By Detailed Product Lines
2. Market Share Estimates and Company Profiles For The Industry Leaders
3. World Trade: Export Market, Import Competition
4. Industry Economic Structure
5. The Price Situation
6. Nature and Performance of Major End-User Markets
7. Distribution Channel Analysis
8. Computer Abstracts of Product Sales Forecasts
9. The Competition: Directory of U.S. and Foreign Suppliers

Marketdata believes that to rely on only one or a few sources for an analysis of an industry is dangerously inaccurate. Only via a consensus of varied opinions can one gain a true picture of actual market conditions, with diversified yet coorborative viewpoints. Consequently, we have utilized a wide variety of Government and private sector sources for this report.

Major sources consulted include:

1. Census and Annual Surveys of Manufacturers, U.S. Bureau of the Census, Department of Commerce
2. Current Industrial Reports (annual editions 1961-84)
3. Bureau of Labor Statistics, annual and monthly Producer Price Indexes
4. Department of Commerce Exports and Imports publications: U.S. Exports by Commodity, By Country of Destination (FT410), U.S. General Imports and Imports For Consumption, Commodity by Country (FT135)
5. Dun & Bradstreet Directories
6. Standard & Poors Industry Surveys and company stock reports
7. Industrial directories: Thomas Register, Electronic Engineering Master
8. Industry trade journals/special reports: Electronics, Electronic Business, Electronic News
9. Dialog/Lockheed Predicast U.S. database of forecasts abstracts
10. Company annual reports, product catalogs, 10K statements
11. Original Marketdata proprietary files and forecasts

INDUSTRY OVERVIEW AND EXECUTIVE SUMMARY

The United States electronic connectors industry is a sizeable and relatively steady growth area of the overall electronic components business. Like most component sectors, it has been faced with recent challenges and a vulnerability to key end-use sectors' performance, as well as a too-strong United States dollar. However, the industry should pull through this latest phase poised for renewed growth, fueled by new technologies and applications, and continued emphasis on military electronic business associated with Defense Department programs.

The latest Commerce Department official sales statistics indicated that the connectors market was valued at $3.17 billion during 1984. Marketdata expects the market to generate a volume of $3.82 billion by the end of 1986, a 10.2% average yearly rate of growth from 1984-86. Looking further out, we forecast the market to reach $5.25 billion by 1990 - for a 9.4% average yearly gain from 1986-1990. The ten-year 1974-84 average annual growth rate was in excess of 30%, but this rate will fall naturally as percent increases are calculated on a much higher sales base.

Certain industry analysts feel that 1985 was a disastrous year for the industry, with sales volume dropping 15-20% in a drastic and unanticipated downturn caused by soft markets in computers and peripherals and many commercial and telecommunications sectors. Marketdata does not feel that this downturn was as substantial as some analysts are saying. Looking at the historical performance of the market, one clearly sees that the biggest market slump took place during 1975, when sales declined by 13.5%. One must remember that this was during a very severe economic recession. In the only three other years when the market

for connectors contracted (1967, 1971, 1982), sales only dropped about 2.5% each time. Marketdata compares the 1985 downturn to these less severe contractions, and feels that a turnaround will occur in 1986 and beyond.

Whereas several years ago the big issue concerning the industry was the price of gold rising to $850 per ounce (resulting in producers tacking on price surcharges and rushing to incorporate new production technologies utilizing less gold), now competitors face a new set of challenges:

1. increased United States and foreign competition
2. vulnerability to several large end-use sectors
3. price resistance to fiber optic and high-density devices
4. transfer of production to offshore facilities

There is no doubt that the connector industry is very competitive - there are at least 227 suppliers that Marketdata can identify. The greatest number of competitors are concentrated in the printed circuit and cable connector areas, no surprise since these are amongst the fastest-growing market segments. PC connector sales rose at an 18.8% average yearly rate from 1979-84, reaching $725 million. We expect volume to top $910 million by 1986 and $1.28 billion by 1990. This represents roughly 24% of the total connector market.

The top dozen or so producers probably capture in excess of 70% of total industry sales, and include such companies as: industry leader AMP, Amphenol, ITT Cannon, TRW, Du Pont Connector Systems (formerly Berg Electronics), Augat, Bundy, Molex, Deutsch, and Brand-Rex.

As of 1983, about 150 firms operated nearly 200 production plants nationwide, employing 36,700 workers. In that year $146 million was invested in new capital expenditures, 77% to new machinery and equipment. Investment in the future continues strong, as manufacturers bet heavily on new fiber-optic connector acceptance and increased use of high-density devices, designed for computer OEMs. Much of this new investment no doubt is also slated for new offshore production facilities set up in the Far East, Mexico, and in the Caribbean. Offshore production is needed to hold down prices (to stem increasing imports from cheaper labor nations) and to move closer to end-user systems producers that have moved offshore in large numbers in recent years.

Despite high labor productivity, the industry has been forced to "run leaner" and many producers trimmed their payrolls during 1985. AMP was reported to have reduced its domestic work force of 13,000 by approximately 1,000 people during the first three quarters of 1985. Winchester Electronics (a Litton subsidiary) cut about 15% of its workforce. Many firms had longer than usual summer plant shut-downs, and have trimmed management as well as production rolls.

Roughly 50% of all connector plants are medium-sized, with employments of 50-500 workers. In 1982, only two employed 2,500 or more workers. Fully 71% of the total number of United States plants were located in six states: California (54 plants), Pennsylvania (19), Massachusetts (17), Connecticut (15), Illinois (14), and New York (13). Pennsylvania and Connecticut facilities had the lowest operating costs while New York plants had the highest rate.

The industry runs a balance of trade "surplus". Marketdata estimates that United States connector exports reached $361 million in 1985, compared to $252 million of imports.

Since the late 1970's exports have represented roughly 12% of domestic sales volume. An extremely strong United States dollar during 1985 was the main cause for exports volume to drop an estimated 5.8% to $361 million. This situation should change in 1986 however, as the dollar is now losing strength against Japanese and European currencies. Most exports of connectors are destined for Canada, Japan, England and Mexico, along with several West European nations. Many United States producers now have offshore production facilities located in the Far East (Singapore, Taiwan, Korea, Japanese joint ventures, etc.). Some portion of this "exports" volume is undoubtedly connectors shipped abroad for assembly, to take advantage of cheaper labor rates.

Based on available data, Marketdata estimates that 1985 imports totalled $252 million, down about 13% from the prior year. Imports now represent about 9% of domestic sales, versus 4-6% in the late 1970's. Most connector imports are from Mexico (17%), Japan (14%), Canada (14%), and Taiwan (13%). As for exports, a significant share of these "imports" are probably devices shipped back to the United States from overseas plants operated by United States companies - rather than pure competition.

As for the connector price situation, in 1985 overall price tags were up a modest 3%, following the prior year's small rise of 2.9%. Market conditions have held a lid on prices, competitive pressures have dictated moderate increases if at all. Prices have been raised only in specific, proprietary market niches. In addition, there are no clouds on the horizon that would give manufacturers reason to raise prices, as was the case in the early 1980's. Back then, the big jump in gold prices, plus much higher inflation rates justified double-digit connector price increases. For the last two years, and forseeably over the next year into 1987 at least, inflation seems to be in check and gold prices not a factor. The larger connector producers are in a better position to cut costs via manufacturing improvements and greater capital spending. Therefore, they are able to maintain profit margins better.

One major component distributor, Wyle, conspicuously withdrew from the connector business in 1985. However, this firm was the exception rather than the rule. Most distributors see the connector market as a solid, moderate-growth component business - not immune to recessions and foreign competition but still a stable market that is less volatile than an area such as semiconductors. Connectors sales make up 20-25% of the total United States components market, and will not disappear in the near future, contrary to the opinions of those that feel that "mechanical" passive components will be replaced by integrated circuits.

Distributors are moving to increasing specialization as they face strong competition from "specialty houses". They are also increasing their involvement in assembly or value-added work related to flat cable and insulation displacement connectors. Due to the high costs of capital investment, most OEMs are not doing this assembly work themselves, and OEMs are moving more to "just-in-time" delivery and contract manufacturing. Distributors estimate that 50% of flat cable and connector distribution business today is related to assemblies.

In summary, Marketdata feels much the same as electronic components distributors. The electronic connectors market is subject to the same forces as other electronic products sectors - namely: import competition, price resistance by end-users, reluctance by end-users to accept new technologies (fiber-optic and high-density devices), rising materials prices and production costs, and general economic conditions (growth vs. recession, strong vs. weak dollar). However, the connector market has proven itself to be less volatile than other component markets over the past 23 years, and its producers are taking the right steps toward operating production facilities more efficiently and countering foreign competition. The industry's end-users are diversified enough to ensure long-term health, although short-term downturns will affect the market adversely. And, the industry's leaders are willing to invest significantly in new technologies and plant moderization that will provide for future growth, thereby striking what Marketdata views as a healthy mix between conservatism and entrepreneurial risk-taking that the market dictates today.

THE HISTORICAL AND FORECASTED U.S. MARKET FOR ELECTRONIC CONNECTORS, BY KIND

Marketdata estimates that the connector market, at the manufacturing level, will reach $3.82 billion by year-end 1986, for a 10.2% average annual increase since 1984. Furthermore, we expect sales to grow at a 9.4% average annual rate through 1990, by which time the market should be worth $5.25 billion. The diverse nature of connector end-user applications, coupled with new technologies on the horizon and strong impetus from military programs, should help insulate the connector market from drastic cyclical downturns characteristic of other electronic components markets such as semiconductors.

Historically, connector sales quadrupled in the ten-year period 1974-1984. The most serious sales decline took place in the severe 1974-75 recession, when revenues dropped 13.5%. Since then, however, sales rose every year except 1982 (a 2.5% decline). Most years, sales growth has been very strong, upwards of 20%, as both computer and military markets heated up, as well as telecommunications sectors.

Currently, Printed Circuit connectors constitute the biggest market segment. Sales of these devices are estimated to reach $910 million, or 23.8% of the total connector market in 1986. The 1990 forecast is for $1.28 billion. PC connectors have accounted for more than 20% of the market consistently since 1978. The latest available Department of Commerce data from 1984 indicate that card insertion PC connectors outpaced two-piece types, $402.7 million to $322.4 million. Sales of both lines nearly doubled between 1979 and 1984.

The second largest market segment is found in Rack and Panel connectors. These connector sales are estimated to reach $665 million in 1986 and $914 million by 1990, or 17.4% of the total market. Sales volume in this line will have doubled from 1980-1986. Within this line, subminiature, ribbon and blade contact connectors accounted for about two-thirds of rack and panel volume ($295.1 million) in 1984. Integral shell, MIL-C-22857, and similar types accounted for the remainder (about $125 million in 1984).

Cylindrical connectors will constitute an estimated 14.5% of the total market in 1986, forecast to rise to 16.5% by 1990. Sales by United States producers are estimated at $554 million, forecast to reach $867 million by 1990. Sales of this line fell 15% in 1982, but have grown steadily since then, to an actual United States Government figure of just about $500 million in 1984.

Three sub-segments exist in the cylindrical connector area: heavy duty and standard, miniature, and subminiature types. According to 1984 Commerce Department statistics, sales of heavy duty and standard cylindrical connectors were the highest of all three at $180.2 million (up 18.9% over 1983), followed by miniature types at $168.7 million (up 19.6%), and subminiature types at $150.5 million (up 23.3%). Over the five-year period 1979-84, subminiature devices have sold more briskly than miniature types. In 1979 the mix of cylindrical connector sales was: 45% miniature/30% heavy duty and standard/25% subminiature. By 1984 this mix had shifted to: 36% heavy duty and standard/34% miniature/30% subminiature.

RF (Coaxial) connectors are estimated to constitute a $325 million market in 1986, rising to a forecast $447 million by 1990. This line's share of the total connector market is expected to remain steady at 8.5%. Sales volume jumped significantly in 1981, to the $200 million level. So far, through 1984, volume has remained in the $211-224 million range.

Planar Cable connectors (including fiber-optic types) are expected to constitute 11% of the total connector market, worth $420 million, by 1986. Sales were up a strong 34% in 1984, to $354 million.

Special Purpose/Miscellaneous connectors sales are lumped together into a Commerce Department "catch-all" classification. Sales of these devices were reported to total $641 million in 1984, up 53% over the prior year and accounting for 20% of the total connector market. By a process of elimination, this category must consist of special-purpose custom connectors and insulation displacement devices. Electronics magazine estimated that "special purpose" connector sales will total $536 million in 1986 (or 13% of the market), and "insulation displacement" types $312 million (or 7.6% of the market). These estimates are always higher than Commerce Department statistics because they include distributor mark-ups, while Commerce Department data is measured at the producer level only.

Detailed historical sales data, by type connector devices, follows in this section. Data is tracked from 1961-1984. Other product line sales estimates can be found in section 9 (computer abstracts information and trade journal forecasts).

MANUFACTURERS' SHIPMENTS OF CONNECTORS
ALL TYPES

	Total Value ($ Millions)	Annual % Change	
1961	$ 208.7	-	
1963	274.6	15.8	(avg.annual)
1965	327.8	9.7	"
1967	429.4	15.5	"
1969	472.9	5.1	"
1971	362.8	-11.7	"
1973	670.0	42.3	"
1974	788.8	17.7	
1975	682.6	-13.5	
1976	828.3	21.3	
1977	985.9	19.0	
1978	1,285.8	30.4	
1979	1,633.4	27.0	
1980	2,018.1	23.6	
1981	2,202.6	9.1	
1982	2,148.2	-2.5	
1983	2,586.0	20.4	
1984	3,174.6	22.8	
Estimate 1986	3,823.0	10.2	(average annual rate)
Forecast 1990	5,256.0	9.4	(average annual rate)

SOURCE: United States Department of Commerce, Marketdata Estimates and Forecasts

THE ELECTRONIC CONNECTORS INDUSTRY

INDUSTRY PRODUCT MIX

VALUE OF U. S. PRODUCER SHIPMENTS BY MAJOR TYPE

($ Millions)

	RF (Coaxial)	Cylindrical (All Types)	Rack & Panel (All Types)	Printed Circuit	Misc. Special Purpose Types
1961	$ 22.1	$ 60.1	$ 46.6	$ 24.3	
1963	30.6	77.1	45.6	40.6	
1965	30.2	84.6	63.3	40.0	
1967	48.7	128.3	82.6	67.7	
1969	46.4	114.9	128.3	89.6	
1971	34.7	91.3	84.9	71.0	
1973	63.0	143.1	138.6	138.8	
1974	103.2	133.2	118.4	119.4	$ 200.5
1975	98.0	140.4	95.2	98.4	174.8
1976	104.7	155.0	142.6	175.0	174.5
1977	111.5	174.8	189.0	182.3	183.5
1978	126.9	230.1	247.2	272.1	209.8
1979	146.1	306.9	278.1	373.4	269.9
1980	127.8	392.8	331.7	433.8	300.8
1981	219.3	455.3	393.1	460.1	290.3
1982	214.4	387.6	385.2	444.4	326.7
1983	211.2	414.7	420.1	598.0	418.9
1984	223.8	499.5	441.2	725.1	641.1
Estimate 1986	325.0	554.0	665.0	910.0	787.0
Forecast 1990	447.0	867.0	914.0	1,287.0	925.0

PERCENT DISTRIBUTION OF CONNECTOR SALES
BY TYPE
INDUSTRY PRODUCT MIX

	RF (Coaxial)	Cylindrical (All Types)	Rack & Panel (All Types)	Printed Circuit	Fusion Sealed
1961	10.6%	28.9%	22.4%	11.7%	4.4%
1963	11.1	28.1	16.6	14.8	3.5
1965	9.2	25.8	19.3	12.2	2.7
1967	11.3	29.9	19.2	15.8	3.1
1969	9.8	24.3	27.1	18.9	1.9
1971	10.4	25.2	23.4	19.6	2.7
1973	9.4	21.3	20.7	20.7	1.8
1974	13.1	16.9	15.0	15.1	-
1975	14.4	17.5	13.9	14.4	-
1976	12.6	14.2	17.2	21.1	-
1977	11.2	15.1	18.5	18.3	-
1978	9.9	17.9	19.2	21.2	-
1979	8.9	18.8	17.0	22.9	-
1980	6.3	19.5	16.4	21.5	-
1981	10.0	20.7	17.8	20.9	-
1982	10.0	18.0	17.9	20.7	-
1983	8.2	16.0	16.2	23.1	-
1984	7.0	15.7	13.9	22.8	-
Estimate 1986	8.5	14.5	17.4	23.8	-
Forecast 1990	8.5	16.5	17.4	24.5	-

INDUSTRY PRODUCT MIX
(Continued)

	Plate Module Types	Planar Cable	Hermetic Sealed	Miscellaneous Special Purpose
1974	3.5%	NA	10.9%	25.4%
1975	2.7	NA	8.3	25.6
1976	2.2	0.4%	3.6	21.1
1977	2.6	2.3	3.3	20.4
1978	2.5	7.1	4.3	16.3
1979	2.0	6.5	3.9	16.5
1980	1.7	12.1	4.1	14.9
1981	1.8	10.5	2.3	13.2
1982	1.2	9.7	4.2	15.2
1983	0.6	10.2*	5.9	16.2
1984	0.4	11.1*	5.0	20.2
Estimate 1986	-	11.1*	4.0	20.6
Forecast 1990	-	13.0*	2.5	17.6

NA-Not available

*Includes: fiber optic connectors, planar cable (flat conductor or ribbon, excluding rack and panel (rectangular type)

SOURCE: United States Department of Commerce, Marketdata Estimates and Forecasts

MANUFACTURERS' SHIPMENTS OF CONNECTORS BY TYPE

VALUE IN 1,000 $ - QUANTITY IN MILLION

CONNECTOR EQUIVALENTS

	RF(COAXIAL)			CYLINDRICAL*					
				HEAVY DUTY AND STANDARD			MINIATURE		
	Value	Qty.	Avg. Value Per Unit (Dollars)	Value	Qty.	Avg. Value Per Unit	Value	Qty.	Avg. Value Per Unit (Dollars)
1961	$ 22,075	NA	-	$ 60,103	24.0	$2.50			
1962	29,726	NA	-	72,301	26.7	2.71			
1963	30,632	40.5	$.756	77,103	23.9	2.89			
1964	26,197	34.1	.768	74,751	32.3	2.31			
1965	30,200	44.4	.680	84,555	33.6	2.52			
1966	45,419	59.8	.759	128,372	42.1	3.05			
1967	48,719	54.2	.899	128,302	51.3	2.50			
1968	46,159	53.0	.871	126,207	58.3	2.20			
1969	46,441	55.4	.838	114,880	48.9	2.35			
1970	35,858	45.8	.783	88,084	36.5	2.41			
1971	34,743	49.2	.706	91,318	28.3	3.23			
1972	47,283	69.7	.678	115,292	33.5	3.44			

DATA NOT AVAILABLE

DATA NOT AVAILABLE

MANUFACTURERS' SHIPMENTS OF CONNECTORS BY TYPE

VALUE IN 1,000 $ - QUANTITY IN MILLION

CONNECTOR EQUIVALENTS

(CONTINUED)

	RF (COAXIAL)			CYLINDRICAL*					
				HEAVY DUTY & STANDARD			MINIATURE		
	Value ($000)	Qty. (Mill. Units)	Avg. Value Per Unit (Dollars)	Value ($ 000)	Qty. (Mill. Units)	Avg. Value Per Unit (Dollars)	Value ($ 000)	Qty. (Mill. Units)	Avg. Value Per Unit (Dollars)
1974	$103,217	111.4	.927	$ 46,860	28.9	$1.62	$ 66,838	9.9	$6.75
1975	98,026	104.0	.943	63,530	23.1	2.75	55,869	17.5	3.19
1976	104,655	131.0	.799	42,704	-	-	74,812	14.6	5.12
1977	111,464	160.4	.695	54,748	17.9	3.06	76,395	18.7	4.06
1978	126,871	158.5	.800	67,471	16.5	4.09	104,947	20.6	5.09
1979	146,125	199.8	.731	92,374	27.1	3.41	137,753	26.8	5.14
1980	127,829	212.0	.602	115,735	23.7	4.88	179,471	30.8	5.83
1981	219,344	297.4	.737	144,278	23.9	6.04	191,097	25.6	7.46
1982	214,431	351.6	.609	134,250	25.5	5.26	157,654	23.3	6.77
1983	211,183	327.1	.646	151,637	24.4	6.21	141,019	23.4	6.03
1984	223,776	278.1	.805	180,252	29.6	6.09	168,692	24.3	6.94

SHIPMENTS OF CONNECTORS

(CONTINUED)

	Cylindrical Connectors (Continued)			Rack and Panel (Rectangular)*					
	Subminiature			Integral Shell, Mil-C-22857 (8434) and Similar Types			Subminiature, Ribbon and Blade Contact		
	Value	Qty.	Avg. Value Per Unit (Dollars)	Value	Avg. Value Per Unit Value	Qty.	Value Avg. Per Unit	Qty.	Avg. Value Per Unit (Dollars)
1961					$ 46,615	NA	-		
1962					56,533	NA	-		
1963			DATA NOT		45,585	31.4	$1.45		DATA NOT
1964					50,733	30.2	1.68		
1965			AVAILABLE		63,336	28.5	2.22		AVAILABLE
1966					61,918	NA	-		
1967			UNTIL 1974		82,555	NA	-		UNTIL 1974
1968					102,520	NA	-		
1969					128,269	NA	-		
1970					91,371	NA	-		
1971					84,854	NA	-		
1972					112,973	167.0	6.76		
1973					138,587	445.6	3.11		

SHIPMENT OF CONNECTORS
(CONTINUED)

Cylindrical Connectors (Continued)

Subminiature

	Value ($ 000)	Qty. (Mil. Units)	Avg. Value Per Unit (Dollars)
1974	$ 19,524	4.3	$4.54
1975	21,050	6.6	3.19
1976	37,525	-	-
1977	43,700	-	-
1978	57,680	57.9	.996
1979	76,759	83.0	.925
1980	97,609	78.1	1.249
1981	119,962	111.7	1.073
1982	95,655	93.7	1.021
1983	122,034	96.4	1.266
1984	150,536	117.4	1.282

Rack and Panel (Rectangular)*

Integral Shell, Mil-C-22857 (8434) and Similar Types

	Value ($ 000)	Qty. (Mil. Units)	Avg. Value Per Unit (Dollars)
1974	$ 46,487	321.1	$.145
1975	34,651	NA	-
1976	55,014	-	-
1977	72,536	-	-
1978	80,361	289.9	.277
1979	104,568	330.6	.316
1980	119,966	315.1	.381
1981	187,581	591.5	.317
1982	167,173	513.9	.325
1983	124,919	423.5	.295
1984	124,424	406.6	.306

Subminiature, Ribbon and Blade Contact

	Value ($ 000)	Qty. (Mil. Units)	Avg. Value Per Unit (Dollars)
1974	$ 71,951	165.3	$.435
1975	60,545	NA	-
1976	87,627	141.8	.618
1977	116,471	189.8	.614
1978	166,854	183.4	.910
1979	173,564	435.1	.399
1980	211,704	413.0	.513
1981	205,531	409.1	.502
1982	217,996	513.1	.425
1983	316,755	687.5	.461
1984	295,147	695.7	.424

SHIPMENTS OF CONNECTORS

(CONTINUED)

	Hermetic Sealed (exc. single contact or coaxial types)			Printed Circuit						
				Card Insertion Types				Two-Piece Types		
	Value	Qty.	Avg. Value Per Unit (Dollars)	Value	Qty.	Value	Qty.	Avg. Per Unit	Qty.	Avg. Value Per Unit (Dollars)
1961						$ 24,336	NA	-		
1962						29,078	NA	-		
1963			DATA NOT			40,629	29.7	$1.37		DATA NOT
1964						41,060	32.9	1.25		
1965			AVAILABLE			40,043	31.1	1.29		AVAILABLE
1966						60,961	45.6	1.34		
1967			UNTIL 1974			67,678	49.3	1.37		UNTIL 1974
1968						88,114	103.7	.85		
1969						89,618	134.6	.67		
1970						78,241	185.2	.42		
1971						71,042	180.1	.39		
1972						110,145	434.4	.25		
1973						138,813	742.9	.19		

SHIPMENTS OF CONNECTORS

(CONTINUED)

	Hermetic Sealed (exc. single contact or coaxial types)			Printed Circuit					
				Card Insertion Types			Two-Piece Types		
	Value ($ 000)	Qty. (Mill. Units)	Avg. Value Per Unit (Dollars)	Value ($ 000)	Qty. (Mill. Units)	Avg. Value Per Unit (Dollars)	Value ($ 000)	Qty. (Mill. Units)	Avg. Value Per Unit (Dollars)
1974	$ 86,150	—	$ —	$ 82,841	—	$ —	$ 36,527	824	$.044
1975	56,959	—	—	67,393	—	—	31,038	NA	-
1976	29,443	2.9	10.15	131,564	*	-	43,448	*	-
1977	34,425	4.7	7.32	109,077	*	-	73,210	1,012	.072
1978	54,680	8.6	6.36	163,272	638.9	.26	108,814	1,040	.105
1979	63,046	8.7	7.25	205,852	884.5	.23	167,566	1,111	.151
1980	82,709	10.9	7.59	238,989	968.3	.25	194,804	980	.199
1981	50,776	7.0	7.25	254,096	1,030.7	.25	205,959	1,524	.135
1982	89,989	8.2	10.97	241,159	943.2	.26	203,206	1,353	.150
1983	152,480	13.2	11.55	321,403	1,228.0	.26	276,619	2,006	.138
1984	158,191	13.9	11.38	402,711	1,712.1	.14	322,361	1,362	.237

SHIPMENTS OF CONNECTORS

(CONTINUED)

	Fusion Sealed			Other Kinds		
	Value	Qty.	Avg. Value Per Unit	Value	Qty.	Avg. Value Per Unit
1961	$ 9,111	2.2	$4.09	$ 46,497		
1962	15,286	3.9	3.92	52,833		
1963	9,604	2.1	4.57	71,027		
1964	7,847	2.9	2.70	78,606		
1965	8,979	3.2	2.81	100,641		
1966	14,603	10.2	1.43	130,838		
1967	13,295	9.4	1.41	88,815		
1968	13,429	11.1	1.21	74,982		
1969	9,251	8.9	1.04	84,462		
1970	8,945	5.7	1.57	77,839		
1971	9,738	3.4	2.86	71,085		
1972	8,369	3.3	2.54	87,913	515.4	$.17
1973	12,235	3.8	3.22	113,720	980.2	.12

SHIPMENTS OF CONNECTORS

(CONTINUED)

	Plate Module Types			Planar Cable	Miscellaneous Special Purpose
	Value ($ 000)	Quantity (Mill. Units)	Avg. Value Per Unit (Dollars)	(Flat Conductor or Ribbon) Value ($ 000)	Value ($ 000)
1974	$27,900	10.9	$ 2.56		$200,477
1975	18,739	6.0	3.12		174,777
1976	18,524	-	-	$ 3,522	174,520
1977	27,090	-	-	63,911	183,529
1978	23,845	10.7	2.23	91,370	209,845
1979	31,905	26.7	1.19	106,255	269,865
1980	33,983	20.7	1.64	243,321	300,819
1981	40,664	19.5	2.08	231,981	290,333
1982	25,437	14.4	1.77	208,794	326,734
1983	15,584	10.1	1.54	263,186	418,910
1984	12,239	5.4	2.27	353,940	641,103

MARKET SHARE ESTIMATES AND COMPANY PROFILES FOR THE INDUSTRY LEADERS

Estimating accurate share of market for a group of companies within a specific market or industry is always a difficult task at best. Since information is frequently sparse and uneven in depth in quality, one must assemble pieces of a puzzle from a variety of sources. Some firms are publically-owned and release very good, detailed information in the form of Annual Reports, 10K financial statements, etc. and the investment community publishes data on these firms via stock reports and analyses (Standard & Poors, Value Line, Dun & Bradstreet). Other sources include: industrial/engineering directories, product catalogs, and trade journal articles and special surveys. Marketdata has utilized all of these in preparing this section of the report. Frequently, the exact electronic connector sales of a firm are "buried" in total company or divisional numbers.

Marketdata has considered the following in its method for estimating share of market:

1) previous estimates by other market research firms and investment brokers

2) trade journal articles that provide concrete sales figures for specific companies

3) actual company employees related to total industry employment

4) breadth of product line, extent of connector product lines listed in various directories

5) phone conversations with industry analysts and trade journal editors that track the market and companies on a regular basis

6) supplier product literature and advertising exposure

Based on a careful analysis of the above information, following are Marketdata's estimates of current share of market for the industry leaders:

ESTIMATED 1986 SHARE OF THE U.S. CONNECTOR MARKET

Rank	Company	Estimated Sales ($ Millions)	Share of Market (Based on Total of $3.82 billion in Sales)
1.	AMP	$841	22.0%
2.	ITT Cannon	328	8.6
3.	Molex	253	6.6
4.	Amphenol	210	5.5
5.	Bendix	210	5.5
6.	DuPont (Berg)	202	5.3
7.	TRW Cinch	202	5.3
8.	3 M	184	4.8
9.	Burndy	130	3.4
10.	Augat	122	3.2
11.	Winchester Elec.	107	2.8
12.	Thomas & Betts/Ansley	84	2.2
13.	Deutsch	80	2.1
14.	Omni Spectra	50	1.3
	Midland-Ross	50	1.3
	CTS Fabri-Tek	50	1.3
	Viking Elec.	50	1.3
	Sealectro	50	1.3
Cumulative Total:		$3,203	83.8
All Other Firms:		$ 620	16.2

As an example of how market share has shifted from five years ago, following are 1981 estimates made by Merrill Lynch and cited in a 1983 connectors market survey by Electronic News. As one can see, AMP is still the market leader by a good margin, and probably increased its market share slightly. Molex moved up the ranking substantially, with ITT Cannon and Amphenol still major players.

MERRILL LUNCH 1981 ESTIMATED SHARE OF THE CONNECTOR MARKET

Rank	Company	Estimated Sales ($ Millions)	Share of Market (Based on $2.2 billion sales)
1.	AMP	$455	20.7%
2.	ITT Cannon	175	7.9
3.	Amphenol	140	6.3
4.	Bendix	140	6.3
5.	Berg	140	6.3
6.	TRW Cinch	110	5.0
7.	3 M	105	4.8
8.	Augat	80	3.6
9.	Burndy	75	3.4
10.	Deutsch	70	3.2
11.	Brand-Rex		
	Molex	55-70	2.5-3.2
	Winchester		

Electronic News, in a special November, 1983 article on the connectors market, estimated market share by product line, by company. Following are their estimates:

RACK AND PANEL CONNECTORS - $420 MILLION MARKET

ITT Cannon	23%
AMP	22
TRW Connector	16
Amphenol	8
Winchester	7
Burndy	4
Others	20

PRINTED WIRING BOARD CONNECTORS - $598 MILLION MARKET

AMP	27%
Berg	16
GTE Sylvania	5
Molex	5
Winchester	4
Viking	3
TRW Connector	3
Others	37

CYLINDRICAL CONNECTORS - $415 MILLION MARKET

Bendix	22%
ITT Cannon	15
Amphenol	10
Deutsch	10
Matrix	8
TRW Connector	4
Burndy	4
Others	27

COAXIAL CONNECTORS - $210 MILLION MARKET

Amphenol	20%
Sealectro	14
Omni Spectra	14
AMP	12
Kings	12
Others	28

FLAT CABLE CONNECTORS - $200 MILLION MARKET

3 M	35%
Thomas & Betts/Ansley	20
AMP	15
Berg	12
Winchester	5
Others	13

RECENT COMPANY DEVELOPMENTS

March 31, 1986: ITT Combines Managements of United States and Europe Into New ITT Electromechanical Components Worldwide

ITT combined connector, relay, and switch managements into this new organization. Operations involved are all ITT Cannon connector divisions in North America, Europe, Asia, ITT Pomona, California, ITT Schadow of Eden Prairie, Minnesota, and ITT Electromechanical Component companies in Europe. The European-based companies, previously concentrating on marketing and manufacturing connector, switch and relay products in local markets, will seek to establish themselves in the United States. Some joint

marketing will take place through existing distribution and sales channels previously established by ITT Cannon's North American sales force. The consolidated companies are expected to have roughly $500 million in 1986 sales, the largest single unit being Cannon (based in Santa Ana, California). Group headquarters are in Fountain Valley, California.

April 28, 1986: HP, Amphenol, M/A-Com Develop Coaxial Connectors

Hewlett-Packard, Amphenol and M/A-Com Omni Spectra have developed jointly a line of coaxial connectors with performance specified to 50 MHz. Three grades of connectors were developed: 1) production grade for use in systems, components, cabling, microstrip and related transmission media - being brought out by M/A-Com as its OS-50 family, 2) the instrument grade, intended for test and measurement and air dielectric applications - produced by Amphenol, and 3) the metrology grade for highly precise measurement and stability requirements - made by HP. Prices range from $325 to $850 single quantity, delivery at 12 weeks.

CONNECTOR COMPANY INVOLVEMENT IN THE FIBER OPTIC MARKET

The fiber optic connector market is estimated to be valued at about $25 million in 1985. It is small in relation to the total market now, but is expected to grow rapidly to $120 million by 1990 as this technology becomes more accepted and prices come down, as well as a broadening of end-user applications beyond such customers as A T & T.

AMP has positions in two firms, Lytel - a maker of laser diodes, LEDs transmitters and receivers, and FOCS - a systems installation

company. Amphenol has dedicated $18 million to fiber optics R & D over the next five years and has set up a new technology center at its headquarters location in Lisle, Illinois. Dorran is amongst the leaders in this emerging market. It was started in 1983 and has 260 employees now. Kodak is making a long-term commitment to this market, and now has 50 people involved in design, engineering and marketing. DuPont Connector Systems has been in the field for five years, and has revived efforts in fiber optics. DuPont forecasts 15-25% yearly growth in office and factory automation. Molex sees significant growth in 1987 and announced a short-haul, slow-speed fiber optic system for use with instrumentation and signal control.

AMP, INC.

AMP is undisputably the industry leader in electronic connectors, wth total company sales of $1.63 billion in 1985. The company serves virtually every manufacturer of electrical and electronic equipment (over 30,000) and customers installing this equipmemt (over 70,000). AMP has subsidiaries in 25 countries, including production facilities in Japan, Singapore and Australia, Europe and Latin America. AMP also has marketing operations in Taiwan, New Zealand, Hong Kong and Korea. The firm is pressing forth with expansion in Singapore, doubling capacity by early 1987.

In 1984, AMP had offshore sales of $683 million, of a total volume of $1.8 billion. Far East sales during 1984 were $228 million. Sales in 1985 were down 9.8%, reflecting soft connector end-user markets and severe price competition. Through the introduction of new products and broadened applications, sales were up for the firm in all but four of 44 years. 80-90% of sales were electronics-oriented. In 1981, Merrill Lunch estimated that AMP's connector sales alone were $455 million, for 20.7% of the market. Marketdata estimates this figure to rise to $841 million by year-end 1986, for 22% of the

market. AMP has grown and been very aggressive in the connectors market over the past several years. The other percentage of total sales is generated by non-connector products such as interconnection production/assembly equipment (much of which is sold to electronic components distributors), fasteners, and their own distribution business.

Following is a financial summary of AMP since 1975:

	Sales ($ Mill.)	Annual % Change	Earnings Per Share
1985	$1,636	- 9.8%	$1.00
1984	1,813	19.7	1.87
1983	1,515	17.8*	1.52
1978	801	31.8*	.89
1975	410	-	.24

*Average annual rate

By 1985, Marketdata estimates that AMP employed 12,000 workers, probably 25-30% of the total connector industry employment.

AUGAT, INC.

Augat manufactures electromechanical products and precision components used for the interconnection of circuits and provides related services, for the electronics industry. Products are used in main-frame computers, minicomputers, peripheral equipment, automobiles, cable TV equipment, process control, automation machinery, graphic arts, medical, military and aerospace equipment, telecommunications and other industrial products. The company's growth has

centered around the rapidly broadened usage of semiconductor components, particularly integrated circuits.

Products include integrated circuit sockets, packaging panels, CATV cable and connector products, miniature and sub-miniature switches, microcircuit packages and related hardware accessories.

Through the 1979 acquisitions of LRC Electronics, Inc., a producer of connectors for the cable TV industry, and Vitek Electronics, Inc., which makes cable TV security devices, Augat has become a leading supplier of components to the cable TV business.

FINANCIAL PERFORMANCE SUMMARY

	Sales ($ Mill.)	Net Income ($ Million)	Net Income As % Sales	Capital Expenditures ($ Million)
1984	$257*	$24.1	9.4%	$23.0
1983	202	23.5	11.6	14.0
1982	188*	20.2**	10.7	11.9
1981	174*	20.1	11.6	16.1
1980	157	18.0	11.4	16.2
1979	134*	16.1	12.0	14.4
1978	79	9.4	11.9	11.6
1977	54	6.1	11.3	3.4

*Reflects merger or acquisition

**Reflects accounting change

BURNDY CORP.

Burndy Corporation is a leading manufacturer of electrical and electronic connectors, offering an integrated line of thousands of types and sizes of connectors and allied products.

About two-thirds of sales is accounted for by the electronics industry for use by original equipment manufacturers. Industries served include commercial and military aircraft, aerospace equipment, automobiles, electronic data processing apparatus, office machines, appliances, consumer electronic equipment and telecommunications.

The other one-third of sales is related to the electronic power industry. This is comprised of connectors, tools to apply the connectors and related products, including cable support systems required in the generation, transmission and distribution of electricity for consumer and industrial consumption and used by electric power utilities, or in construction and maintenance of industrial facilities.

Foreign operations accounted for 37% of sales and 29% of operating profits in 1984.

Connectors made by Burndy range from microminiature components for electronic circuitry to large connectors for utility power stations.

Continued, next page.....

BURNDY CORP. FINANCIAL PERFORMANCE SUMMARY

	Sales ($ Mill.)	Net Income ($ Million)	Net Income As % Sales	Capital Expenditures ($ Million)
1984	$232	$12.8	5.5%	$16.7
1983	212	12.0	5.7	11.7
1982	226(1)	15.3	6.8	17.0
1981	257	32.8(2)	12.8	12.7
1980	254	24.2	9.5	13.0
1979	230	21.4(2)	9.3	13.7
1978	181	15.4	8.5	14.9
1977	155	12.0(2)	7.7	8.2

(1) Reflects merger or acquisition

(2) Reflects accounting change

CTS CORP.

CTS Corp. primarily manufactures electronic components and to a much lesser extent metal products. Segment contributions in 1984:

	Sales	Profits
Electronic components.....	82%	80%
Metal Products.....	18%	20%

Foreign operations accounted for 10% of sales in 1984 and 17% of operating profits.

The sales breakdown by market in 1984 was: data processing 27%, nonelectronic 17%, instruments and equipment 15%, automotive 12%, communications 10%, military 9%, distributor 7%, and consumer 3%.

Electronic components include variable resistors and associated on-off switches, cermet resistor modules, quartz crystals, microelectronic circuits, loudspeakers, crystal filters and oscillators, automotive controls, selector switches, printed circuit boards, connectors, core memory products, and programmable DIP switches.

FINANCIAL PERFORMANCE SUMMARY

	Sales ($ Mill.)	Net Income ($ Million)	Net Income As % Sales	Capital Expenditures ($ Million)
1984	$327[1]	$25.0	7.6%	$28.5
1983	306[2]	9.1	3.0	16.7
1982	223[2]	8.8	4.0	11.7
1981	210[2]	13.1	6.3	8.3
1980	188	10.3	5.5	10.2
1979	188	11.0	5.8	13.8
1978	165	10.8	6.5	9.7
1977	154	11.8	7.7	12.5

[1] Excludes discontinued operations

[2] Reflects merger or acquisition

[3] Before results of discontinued operations in 1984

DUPONT/BERG ELECTRONICS

DuPont (Camp Hill, Pennsylvania) has eight regional United States district sales offices, plus international representation in: Canada, Mexico, Europe, Brazil, Argentina, Japan, Taiwan, Singapore, and Australia. Berg Electronics, Inc. became a division of the DuPont Company in 1972. The firm offers the following connector product lines:

1) Berg/Segment Connector: a 48 position input/output connector providing plug compatibility to IBM 360 and 370 systems.

2) Clincher Connectors: mass terminates flat conductor, flat cable without cable stripping

3) SLT Connectors: plug compatible with IBM systems

4) TLC Connector System: terminates transmission line cable without a paddleboard

5) Card Connectors: mate to o.64 mm, square pins on various centers

6) BergLok Connectors: provide vertical pluggability of logic cards, ceramic substrates, and variety of PC cards

7) Solok Connector Systems: provide reliable mechanical and electrical connection from a ceramic thick film substrate to a PC board

8) Tri-Socket: free standing, wire wrapping socket for integrated circuit interconnections

9) Dual-in-Line Sockets: provide reliable pluggability of IC's to PCB

10) Griplet Connectors: grips a wide variety of component leads to assure a reliable solder joint in a PC board

METHODE ELECTRONICS

Methode's Connector Division (Chicago, Illinois) makes: card edge, 2-piece DIN, MHD and MIL-C-55302, Lite-Link fiber optic connectors, and molded jacks and panels. This division has been in operation for 20+ years, involved in the design, development and manufacturing of interconnect components, devices, assemblies and systems, with primary applications in military, aerospace, telecommunications, instrumentation and data processing.

The Interconnect Products Division (Rolling Meadows, Illinois) produces: TERM-ACON board-to-board and cable-to-board interconnects, JAGUAR IDC wire-to-board interconnect systems, POST/BOXE high density modular connector systems, microcircuit sockets and devices, emulator connectors and cables, UNI-PAC IC, tube, display, transistor and relay sockets, and custom wiring harnesses.

MIDLAND-ROSS CORP.

FINANCIAL PERFORMANCE SUMMARY

	Sales ($ Mill.)	Net Income ($ Million)	Net As % Sales	Capital Expenditures ($ Million)
1984	$708[1]	$20.8	2.9%	$26.0
1983	755[2]	(10.2)	NM	31.4
1982	791[1]	9.5[3]	1.2	33.0
1981	907[2]	24.7	2.7	35.9
1980	908[2]	43.8	4.8	71.2
1979	801[2]	41.0	5.1	61.3
1978	579	31.0	5.4	26.3
1977	471	25.0	5.3	21.6

[1] Excluding discontinued operations and reflects merger or acquisition

[2] Reflects merger or acquisition

NM - Not meaningful

[3] Reflects accounting change

TRW-ELECTRONIC COMPONENTS GROUP AND CYLINDRICAL CONNECTOR DIVISION

TRW's Cylindrical Connector Division (Minneapolis, Minnesota) manufactures the following product lines:

1) Subminiature Coaxial and Power Contacts
2) Nu-Lok 1200 Series Coaxial Connectors, MIL-C-25516
3) Vibra-Lok IV, MIL-C-38999 Series IV Connectors
4) C48, CO909, CN0966, CN0967, CNO915, CN0942, MIL-C 26500 Connectors

TRW provides a complete line of coaxial and power contacts, including straight plugs and receptacles, right angle plugs and receptacles, and matched impedance custom options. Applications for these focus on avionic, instrumentation, telecommunications, and cable TV connections.

Nu-Lok 1200 Coaxial Connectors are used in fluid measurement, instrumentation, and data transmission applications. Vibra-Lok IV Connectors provide rugged, fool-proof, quick-disconnect operation in a miniature electrical connector. TRW C48 Series High Evnironmental Circular Connectors are used when it becomes necessary to provide connections for a large number of circuits in a limited space.

Electronics and space systems in 1984 broke down 15.4% for electronic systems, equipment and services; 14.3% for computer-based and analytical services; 10.2% for spacecraft; and 8.0% for electronic components. Industrial and energy sales in 1984 were divided 8.8% of total sales for fasteners, tools and bearings, 7.1% for pumps, valves and energy services, and 6.8% for aircraft components. Foreign operations accounted for 19% of total sales and

17% of operating profits in 1984. Direct and indirect sales to the United States Government accounted for 39% of total 1984 sales.

TRW, INC. TOTAL COMPANY FINANCIAL SUMMARY

	Sales ($ Mill.)	Net Income ($ Million)	Net as % Sales	Capital Expenditures ($ Million)
1984	$6,062(1)	$267	4.4%	$422
1983	5,493(1)	205	3.7	310
1982	5,132(1)	196	3.8	299
1981	5,285(1)	229(2)	4.3	263
1980	4,984(1)	212	4.3	307
1979	4,560	195	4.3	263
1978	3,787	174	4.6	164
1977	3,264	154	4.7	126

(1) Reflects merger or acquisition

(2) Reflects accounting change

TRW's Cylindrical Connector Division has international representatives in the following nations:

Australia
Austria
Belgium
Brazil
Denmark
Finland
France
Hong Kong
India
Indonesia
Italy
Japan
Korea
Malaysia
Mexico
Netherlands
New Zealand
Norway
Philippines
Rep. of China
Scotland
Singapore
South Africa
South Korea
Spain
Sri Lanka
Sweden
Switzerland
United Kingdom
West Germany
Yugoslavia

WINCHESTER ELECTRONICS

Winchester (Oakville, Connecticut) has been in business since 1941, and is now a subsidiary of Litton. The company manufactures a full line of connector products, such as:

*Rack and panel connectors
*Input/output connectors
*DIN connectors
*Edgecard connectors
*"Flex-Com" connectors
*"C-Press" connectors

These are made in configurations including: rectangular, miniature, etc. Removable contacts, tools and accessories are also sold. The company sells via a network of regional/district offices in the United States, Canada and Japan, as well as a variety of distributors (heavily reliant upon Hamilton-Avnet).

As of November, 1985 the firm was reported to have let go about 15% of its former 1,000 employee workforce, due to soft market conditions. Business was cited down 10-15% versus 1984. Management as well as production workers were affected.

THE MAJOR END-USER MARKETS FOR CONNECTORS: AN ANALYSIS OF DEMAND, NATURE, AND PERFORMANCE

OVERVIEW

Demand for connectors stems from four major sectors, original equipment manufacturers of: commercial, military and space, industrial, and consumer equipment. Each contains various sub-segments affected by different forces, driven by different technologies, and varying in growth levels. Below are Marketdata's estimates for their relative importance as connector end-use markets.

ESTIMATED OEM CONSUMPTION OF CONNECTORS, PERCENT OF TOTAL MARKET

1.	Commercial Equipment	47%
2.	Military and Space Equipment	33
3.	Industrial Equipment	15
4.	Consumer Equipment	5

The commercial equipment sector is comprised of three major markets, including: 1. data processing equipment (computer systems, office automation, peripheral devices), 2. communications equipment (telecommunications products, radio and TV, fiber-optic systems, etc.), and 3. test instruments (automated and general test equipment.)

Several major factors at work in the general economy contributed to a relatively lackluster 1985 for connector manufacturers. Uncertainty about the future and a digestion of the plethora of new products let loose on the market were probably the two most important forces. In particular, in the computer industry there was tremendous confusion over new products, and an oversupply. Consequently, buyers

stayed away in large numbers, especially at the low end of the market (personal computers and under-$5,000 systems). This created a ripple effect in peripherals such as terminals, printers, modems, etc. Technology was changing so rapidly, while prices continued to fall, So, buyers took on a "wait-and-see" attitude, delaying purchases until new products with better performance and reduced prices were introduced.

In communications equipment, consumption rose faster than the computer industry (about 14%). Modem sales slumped with personal computer sales and private branch exchange (PBX) makers were involved in tough competition against the spun-off regional Bell operating companies. The test and measurement equipment market, dependent upon other equipment and component markets for growth, should rebound during 1986, paced by new orders for automated test equipment (ATE).

The industrial electronic equipment market's health is based primarily upon capital spending by United States industry. Many manufacturing sectors still haven't recovered from the 1981-82 recession. However, the more vibrant sectors (such as auto makers) continue to invest in automation in an effort to counter ever-increasing foreign competition. These efforts have been largely focused on the installation of more robotics. During 1985, total consumption of industrial electronics equipment was up 12%. This should rise to a 14% gain for 1986, to $8.7 billion.

The consumer electronics market, small by comparison to the other connector end-users, shows solid growth and vitality due to free-spending consumers that are gobbling up color TVs, projection TVs, compact-disc systems, and VCRs with a vengence. An infusion of new audio and video products by suppliers helped consumption grow 12% to $22.5 billion in 1985. Growth for 1986 should slow slightly to an 11% gain.

THE COMMERCIAL EQUIPMENT MARKET

1. COMPUTERS/DATA PROCESSING

Total demand is expected to rise 14% (according to Electronics Magazine) in 1986, better than 1985's rate of 11%. During 1985, the industry recorded gains in all product areas except personal computers. For 1986, the best growth is expected in peripheral equipment, 18% gains to $7.82 billion, while office automation sales rise 9.7% to $9.78 billion. Total computer system sales are slated to rise 13.8% to $65.28 billion. Demand for terminals should increase, helped by a proliferation of multi-user microcomputers and small business systems.

Sectors of the economy that haven't fully recovered from the 1981-82 recession are populated by companies that are still reluctant to invest large sums to computerize their offices. Uncertainty over the economy, now past its third year of recovery, has led firms to reexamine and reduce capital-spending plans. Also, customers purchased a huge amount of hardware in 1984 (especially personal and microcomputers), and they are still "digesting" what they bought - not being totally sure that the systems improved their productivity and efficiency. This uncertainty was caused in large part by a lack of adequate applications software and communications products. Detailed breakdowns of market size and growth, by type system, appear in tables in this section. Above-average 1986 growth is expected for: microcomputers, engineering work stations, and supercomputers.

The manufacturing community could develop into a strong market, due to the emerging Manufacturing Automation Protocol being promoted by General Motors and other large firms. This "MAP" is seen as a way to enable industrial machinery to communicate via computers to enhance operational efficiency.

Another development concerning the computer end-use market is OEM reluctance to accept the European "DIN" design standard for connectors. Electronic News reports that: "Despite vendor forecasts of increasing sales of high density and DIN connectors to customers in the computer and peripheral industries, officials at some firms say they'll stick with connectors based on old but proven small-scale integration technologies."

Small office automation and distributed data processing systems, with relatively small memories and data transfer times usually don't require the large pin counts of high-density or DIN connectors. OEMs state that current low density devices offer high enough data transmission speeds to continue well into the future. Peripheral products makers also have been reluctant to cross the 50-pin threshold.

In addition, computer makers often design new systems to be as internally similar to their predecessors as possible. Consequently, new designs often call for the use of inexpensive components which can be stocked in a central location, readily available either from distributors or on the open market, as demand peaks and falls.

2. COMMUNICATIONS EQUIPMENT

Electronics forecasts consumption to rise 14% during 1986, the same as in 1985. Total sales should then reach $23.6 billion. Telecommunications equipment is the largest segment at $6.6 billion (up 9.4% in 1986), followed by data communications products at $4.3 billion (up 17.7%).

During 1985, buyers were faced with confusing new combinations of competitors in the market, as well as an abundance of new products. Their wait-and-see attitude contributed to a cut-back in consumption. The market for PBXs will heat up, as suppliers and regional Bell operating companies scramble for the market. The market is volatile because of the teaming up of major players such as IBM and Rolm and Wang Laboratories with InteCom. Pressure is also being exerted by the operating companies as they expand their

Centrex stations into more business locations. The North American Telecommunication Association in Washington predicts that the market for Bell Centrex stations will expand 9% this year, a potential loss of $800 million in business for PBX vendors, or about 25% of the expected market in 1986.

Fiber Optics is the biggest issue now in communications. Because of the ability of fiber-optic links to handle such heavy loads, these lines are in demand by the cable TV industry, installers of computer-linked businesses and factories, and the military. But, the telecommunications market retains the lion's share: more than 40% of the $1.5 billion fiber-optic market in 1986. This share is expected to grow to 50% by 1990. Also, price has been reduced at the same time that performance has been upgraded. The telephone industry will also benefit from fiber optics, since this technology can handle substantially higher traffic and transmit signals over longer distances between repeater stations. Repeaters are one of the most unreliable elements of telephone networks, especially when handling computer data.

Connector manufacturers have invested heavily in fiber optics, but face tough resistance to higher prices. Many end-users, particularly in the local area network (LAN) and computer sectors promise never to accept the technology until connector prices fall by several orders of magnitude. Amphenol is aggressively pursuing fiber optic business. Kodak recently introduced a fiber optic connector as well. So far, fiber optics has drawn heavy interest only in long-distance communications, where the largest user - AT & T - produces virtually all parts of the system in-house.

The LAN (local area network) network for fiber optics has not yet materialized because not many applications that meet the

necessary requirements. Fiber optics is still more expensive than twisted-pair wires, up to five or six times higher. "Pig-tail" fiber optic connectors are one of these high-priced devices, ranging from $80-150 depending on quantities. While the cost of connectors accounts for approximately 5% of the cost of a long-distance fiber optic system, it may account for as much as 15-20% of a LAN.

Amphenol has set up a new fiber optics technology center in Lisle, Illinois, its headquarters location. Amphenol's parent, Allied Corporation, claims to have allocated $18 million to fiber optics research through 1990. DuPont sees markets emerging in office and factory automation, predicted to grow at a rate of 15-25% yearly, but not for several years. DuPont purchased technology from a Japanese firm in 1984 and also entered into a marketing agreement with Raycom, an optical systems producer.

In sum, there is considerable uncertainty about the fiber optic market. Many connector suppliers don't yet have a clear picture of what they should sell - just connectors, interconnections, subsystems or systems, or how to sell - directly or via associations with other systems players, and to whom to sell - system integrators, end-users, OEMs, architects, building owners, etc.

3. INSTRUMENTATION

The third major commercial market for connectors lies with the instrumentation end-use sector; test and measurement instruments. Electronics reported that test and measurement instrument sales edged up only 1% during 1985, but are expected to rebound to a strong 12% rise in 1986. This market is forecast to reach $6.78 billion this year. About 70% of the market consists of general test equipment, with the remainder in automated test equipment (ATE). ATE equipment includes: discrete compoment test systems, IC testers, and various types of PC-board testers related to the semiconductor market. General test equipment includes a wide variety of 25+ instruments such as: oscillators, panel meters, counters, generators, oscilloscopes, recorders, spectrum analyzers, etc.

During 1985, a strong United States dollar gave imports the edge in the United States market. Reduced factory production of electronic equipment wiped out orders for additional testing tools (especially ATE), and reduced R & D programs by both industry and government caused orders to be dropped for sophisticated and expensive test equipment.

For 1986, a continued fall in the dollar's value should make foreign goods more expensive here, giving United States suppliers a boost. General test equipment sales are expected to rise 15% to $4.8 billion. Part of the 1985 problem, in addition to a general sluggishness in the overall electronics industry, was the shift by the DOD to funding new weapons programs rather than putting more money into the maintenance of existing systems. ATE makers are moderately optimistic about 1986, and Electronics' market forecast forsees demand growing 5% this year. In microprocessor development systems, the four major suppliers - HP, Intel, Tektronix, and Motorola - have replaced their proprietary systems architectures with open architectures, thereby responding to the problems that emerged in 1985.

THE MILITARY MARKET

Various estimates exist about the relative size and importance of the military and space market for connector consumption. Electronic Business magazine estimated that it accounted for $875 million in OEM sales during 1985, or 42% of the total OEM market for connectors. Electronic News estimates that cylindrical and coaxial connectors designed for military use were up 5-10% in 1985, and accounted for 30% of domestic sales. Electronic Business estimated that 20% of total OEM sales to military and space equipment were related to PC connectors, and 37% to cylindrical standard and high-density devices.

Whatever the true size and share of the market, there is no doubt that this is a significant end-use market, perhaps fully one-third of total connector consumption, and increasing in importance for many connector producers. The military market becomes even more important in light of depressed telecommunications and computer end-use sectors. In this section is an analysis of connector shipments and industry employment related to various government agencies, the bulk of shipments going to the Department of Defense.

According to Assistant Secretary of Defense, James P. Wade Jr., changes are on the horizon at DOD. He stated that a variety of actions have been taken to overcome procurement system impediments, such as an emphasis on "producibility," factory modernization, increased competition, scrutiny of overhead costs, increased contract auditing and surveillance activities. There will be a renewed philosophy of continuous quality improvement.

Mr. Wade stated that: "competition is too frequently based just on price, and an 'award to the low bidder' mentality is too pervasive. We plan to move away from defining equipment requirements in minimally acceptable terms to a system whereby the best quality equipment at an acceptable price is our recognized objective".

THE INDUSTRIAL ELECTRONIC EQUIPMENT MARKET

Electronics sees this market's demand rising 14% to $8.7 billion in 1986, higher than the 12% gain in 1985, but for performance to be "uneven". Uncertainty about the direction of the United States economy points to caution in the overall market (especially process control equipment). But, the future for robotic systems looks bright.

Process control equipment sales are estimated to total $4.67 billion in 1986, nearly 54% of the total industrial electronic equipment market, while robots account for $510 million and pollution control equipment for $1.18 billion. The sluggish United States manufacturing sector, much of which has not fully recovered from the 1981-82 recession, coupled with a leveling of demand from petrochemical firms, means a probable slowdown for process control equipment sales. Equipment here includes: data acquisition systems, process instrumentation, sequence controllers, and data loggers.

On the other hand, robotics is the new high-growth segment. Besides increased factory automation to boost labor productivity and international competitiveness, optimism also stems from the commitment of many manufacturers (including GM) and equipment suppliers to a proposed Manufacturing Automation Protocol system (MAP) of communications for factory equipment. This system allows diverse pieces of industrial equipment to communicate with each other.

Some segments of the industrial robots market (spot welding in car manufacturing) are becoming saturated, but new demands are beginning to emerge. Among these are the use of robots in electronic components assembly and systems, and in clean rooms at semiconductor producers.

THE CONSUMER ELECTRONIC EQUIPMENT MARKET

The consumer electronics end-use sector for connectors is a small one - perhaps 5% of the total market. Consumer video equipment (color and black and white TVs, projection TVs, VCRs, video cameras, videodisk players) constitutes a $13.7 billion market, forecast to rise 14% in 1986, on top of an 18% gain during 1985. Consumer audio equipment (car audio, stereo systems, radios,

tape recorders, CD players, etc.) will account for $6.78 billion in sales, up 6.6% in 1986. This follows a 4.9% gain in 1985. Other consumer electronic products include: calculators, clocks, games, musical instruments, microwave ovens, electronic watches, and telephone answering machines. These products will account for $4.38 billion in sales in 1986, up 5.6%. This follows a 6% gain in 1985.

Electronics expects United States consumers to continue to spend freely on sophisticated electronic products during 1986, meaning that manufacturers of such high-ticket items as VCRs, compact-disk players, and stereo and projection TVs can expect another year of healthy growth. Consumption of electronic products for the home should be up 11% in 1986 to almost $25 billion.

RECENT AND FORECASTED PERFORMANCE OF MAJOR CONNECTOR END-USER SECTORS (1984-1986)

	1984	1985	1986	Percent Change From Prior Year 1985	1986
	($ Millions)				
Commercial Equipment					
Total Data Processing Equipment	$51,741	$57,373	$65,289	10.9	13.8
All Computer Systems	25,568	28,090	31,956	9.9	13.8
All I/O Peripherals	5,930	6,630	7,821	11.8	18.0
All Office Automation	7,785	8,920	9,783	14.6	9.7
Total Communications Equipment	18,282	20,792	23,607	13.7	13.5
All Telecommunications	5,510	6,043	6,613	9.7	9.4
TV Equipment	1,252	1,363	1,516	8.9	11.2
Fiber Optic Systems	879	1,202	1,539	36.7	28.0
Test Instruments	5,998	6,039	6,781	0.9	12.3
Industrial Electronic Equipment	6,784	7,626	8,682	12.4	13.8
Consumer Electronics	20,085	22,507	24,897	12.1	10.6

SOURCE: Electronics Magazine Annual Market Forecast, Percent Change Calculations by Marketdata

PERFORMANCE OF THE DATA PROCESSING MARKET, BY TYPE EQUIPMENT (1984-1986)

	($ Millions)			Percent Change From Prior Year	
	1984	1985	1986	1985	1986
Computer Systems					
Personal Computers (under $5,000)	$1,180	$1,090	$1,260	- 7.6	15.6
Micro computers ($5-20,000)	2,374	2,778	3,361	17.0	21.0
Minicomputers ($20-100,000)	5,870	6,395	7,099	8.9	11.0
Superminis ($100-400,000)	6,545	7,060	7,836	7.9	11.0
Mainframes ($400,000-$5 million)	8,290	8,870	9,897	7.0	11.6
Supercomputers	520	840	1,020	61.5	21.4
Engineering work stations	789	1,057	1,483	34.0	40.3
Office Automation					
Copying equipment	4,090	4,525	4,920	10.6	8.7
Electronic Typewriters	865	1,210	1,285	39.9	6.2
Word processors	2,830	3,185	3,578	12.5	12.3
Peripherals					
High-speed line printers	420	468	515	11.4	10.0
Medium-speed line printers	1,140	1,270	1,495	11.4	17.7
Slow serial printers	2,570	2,840	3,440	10.5	21.1

SOURCE: Electronics Magazine, Percent Change Calculations by Marketdata

PERFORMANCE OF THE COMMUNICATIONS EQUIPMENT MARKET, BY DETAILED PRODUCT LINE (1984-1986)

	($ Millions)			Percent Change From Prior Year	
	1984	1985	1986	1985	1986
Complete Fiber Optic Systems	$ 521	$ 714	$ 943	37.0	32.1
Telecommunications Equipment					
Data Switching Systems					
Central Office	73	86	95	17.8	10.5
PABX	140	162	178	15.7	9.9
Voice Switching Systems					
Central Office	2,310	2,570	2,820	11.3	9.7
PABX	2,800	2,920	3,110	4.3	6.5
Packet-Switching Systems	187	305	410	63.1	34.4
Total Data Communications (modems, multiplexers, controllers)					
TV Equipment, Total	1,252	1,363	1,516	8.9	11.2
Radio, Total	2,745	3,209	3,742	16.9	16.6

SOURCE: Electronics Magazine, Percent Change Calculations by Marketdata

CONNECTOR SHIPMENTS TO GOVERNMENT AGENCIES BY PRIME AND SUBCONTRACT TYPE (1980-1983)

Total Government Shipments

	Number of Employees Involved	Percent of Industry Employment	Value of Shipments ($ Mill.)	Percent of Industry Shipments
1980	4,300	11.6%	$309.8	13.7%
1981	5,000	14.2	276.2	12.0
1982	6,500	18.1	305.9	13.3
1983	5,600	15.5	335.3	12.1

	Prime Contracts		Subcontracts	
	Employees	Shipments ($ Mill.)	Employees	Shipments ($ Mill.)
1980	900	$84.2	3,400	$225.6
1981	900	43.6	4,100	232.6
1982	1,000	47.1	5,500	258.8
1983	600	33.8	5,000	301.5

SOURCE: Current Industrial Reports, Shipments to Federal Government Agencies

CONNECTOR SHIPMENTS, BY GOVERNMENT AGENCIES

(1980-1983)

	To DOD	To NASA
1980	$197.8	$ 2.1
1981	134.5	1.8
1982	150.7	1.6
1983	197.5	4.3

	To DOE	To Other Agencies
1980	-	109.9
1981	-	139.9
1982	-	153.6
1983	0.1	133.4

RECENT AND FORECASTED PERFORMANCE OF THE INDUSTRIAL ELECTRONIC EQUIPMENT SECTOR, BY TYPE EQUIPMENT

(1984-1986)

($ Millions)

				Percent Change From Prior Year	
	1984	1985	1986	1985	1986
Total Equipment	$6,784	$7,626	$8,682	12.4	13.8
Energy Management Equipment	481	519	558	7.9	7.5
Inspection Systems	347	397	456	14.4	14.9
Motor Controls	771	752	823	-2.5	9.4
Numerical Control Equipment	278	345	378	24.1	9.6
Pollution Control Equipment	936	1,021	1,183	9.1	15.9
Process Control Equipment	3,560	4,111	4,671	15.5	13.6
Robot Systems	333	395	510	18.6	29.1
Thickness Gauges and Control	78	86	93	10.3	8.1

SOURCE: Electronics Magazine, Market Forecast, Percent Change Calculations by Marketdata

WORLD TRADE IN THE CONNECTORS INDUSTRY: EXPORT MARKETS AND IMPORT COMPETITION

The United States connector industy has experienced a positive "balance of trade" (exports minus imports) since the mid 1970's. Based on available monthly data through the Fall of 1985, Marketdata estimates that connector exports by U.S. producers in 1985 were valued at $361 million, compared to $251.9 million of imports. This produced a trade "surplus" of $109 million.

A peak surplus of $126.6 million occurred during 1980, followed by a sharp drop to $70.3 million by 1983. Since 1983, the trade surplus has grown to its present level of $109 million.

Exports in 1985 are estimated to have dropped 5.8%, but since the late 1970's exports have represented about 12% of the domestic sales volume. By product line:

1. Rack and panel types constituted a $60.5 million market in 1985 (down 7.7% from 1984).
2. Cylindrical types were valued at $49.5 million (up a strong 32%).
3. Printed Circuit types accounted for $33 million of exports (up 2.9%).
4. Coaxial types constituted a $31.8 million market (up 2.6%).
5. Miscellaneous "Other Electrical types constituted the biggest segment at $186.2 million (down 14.4%).

Relative to domestic sales, printed circuit connectors are exported less (4-5% exports as % domestic sales), as are cylindrical types (5-7%), than for other types and the industry in general.

Nearly 40% of connector exports now go to three nations - Canada, Japan, and England, compared to 33% in 1980. Mexico also remains a large trading partner, along with Western European nations. Almost 61% of rack and panel devices now are exported to Japan, England and West Germany and 55% of coaxial types are destined for Mexico, Canada and England (1985 estimate).

Undoubtedly, a significant share of exports to Japan, Mexico, and some Far East nations such as Taiwan probably represent U.S.-made devices shipped to assembly plants located there, eventually shipped back to the United States for sale. The exact percentage is not know, however, many connector firms have sharply expanded their offshore manufacturing efforts in light of recent large-scale moves to foreign sites by United States system and peripheral makers.

AMP, the industry leader, is expanding in Singapore. TRW's Connector division stated that, in the long run, they must produce in the Far East. The consumer market has been in the Far East for years but the move of data processing manufacturers is recent. Currently, TRW has a production facility in Haiti, as well as a Mitsumi-TRW joint venture in Japan. Most major United States connector firms have either joint ventures or their own facilities in Japan. Augat has no offshore facility yet, but it is under consideration. Producers can also obtain as good a deal in Mexico or the Caribbean as in the Far East.

DuPont Connector Systems (formerly named Berg) has plants in Singapore and Taiwan and was readying a new facility in Korea by October, 1985. DuPont personnel have stated that at first, the Taiwan plant in the late 1970's produced connectors that were mainly shipped back to the United States for sale. But today, the majority of its output is sold locally.

AMP has 26 operating facilities outside North America, including: Japan, Singapore and Australia, and marketing operations in Taiwan, New Zealand, Hong Kong and Korea. It also has numerous manufacturing plants in Europe and Latin America. An expansion phase is planned for Singapore. The bulk of AMP's Far East output is said to be sold locally.

Molex has five plants in Japan, two in Singapore, one in Taiwan and Korea, and a majority-owned facility in Hong Kong.

Industry analysts estimate that in 1984 AMP had offshore sales of $683 million, out of $1.8 billion in total sales. Far East sales amounted to $228 million.

IMPORT PENETRATION

The value of United States connector imports has risen from about $31 million in 1976 to an estimated $252 million by 1985. Marketdata estimates that the value of imported devices dipped 12.9% in 1985, after eight successive yearly increases. Imports represent roughly 9% of domestic sales now, versus 4-6% in the late 1970's.

The largest product line (as in exports as well) in dollar terms is The Commerce Department's "catch-all" category entitled "Other Electrical Connectors", in other words miscellaneous devices other than cylindrical, printed circuit, rack and panel, and coaxial devices. This category accounted for $174 million, or 69% of total imports in 1985. Cylindrical types amounted to $41 million of imports, followed by printed circuit connectors at $19.3 million, rack and panel types at $9 million, and coaxial connectors at $8.3 million.

Marketdata estimates that in 1985, imports of cylindrical and PC connectors increased significantly, while all other

categories declined. We estimate that rack and panel connector imports dropped especially heavily, over 42%, during 1985. But, this was from an unusually high level of $15.5 million in 1984.

By country of origin, Mexico was the source of the largest dollar volume of United States connector imports in 1985, accounting for about 17% of the total. This is compared to 21.7% back in 1980. Japan and Canada followed closely at 13.9% each, and Taiwan was next at 13.1%. Haiti accounted for 6%, and France and West Germany together constituted another 14%. As mentioned previously, a good portion of the "imports" from Mexico, Japan, Taiwan and Haiti is probably related to United States-operated production facilities, and cannot be considered import penetration or competition in the true sense of the word. Imports from France and West Germany are more likely to be truly competitive devices.

By product line...

1. Nearly 55% of cylindrical connector imports in 1985 were from Mexico, Japan and Taiwan (vs. 60.7% in 1980).

2. 67% of imported coaxial connector devices originated in Japan, Mexico and France.

3. 68% of rack and panel devices came from Canada, France and Mexico.

4. 56% of PC connectors originated from Canada, Mexico and Thailand combined.

5. Nearly 68% of "miscellaneous" types came from Taiwan, Japan, Mexico, Canada, and West Germany.

In Japan, Hirose Electric Co. is estimated to have connector sales volume of $134 million yearly. The Japanese connector market is divided into 36% consumer electronics, 19% for communications, 17% for computers and office equipment, and 9.5% industrial. The military market is considerably smaller. MIL-C-5015 connectors previously used for military purposes are now mass-produced in Japan for industrial applications such as robotics. AMP and other United States producers are far ahead in design technology, but the Japanese are experts at mass production.

CONSUMPTION FORECASTS FOR MAJOR OVERSEAS MARKETS FOR ELECTRONIC CONNECTORS AND TOTAL PASSIVE COMPONENTS

(Source: 1986 Overseas Market Report - Electronics Magazine*)

Country	1984	1985	1986
		($ Millions)	
Japan			
Connectors, Plugs and Sockets	$1,180	$1,217	$1,305
Total Passive and Mechanical Components	9,120	8,800	9,368
West Germany			
Connectors, Plugs and Sockets	383	443	491
Total Passive and Mechanical Components	1,906	2,027	2,112
United Kingdom			
Connectors, Plugs and Sockets	278	292	309
Total Passive and Mechanical Components	1,280	1,337	1,420
France			
Connectors, Plugs and Sockets	231	235	251
Total Passive and Mechanical Components	1,014	1,037	1,126
Italy			
Connectors, Plugs and Sockets	58	66	72
Total Passive and Mechanical Components	266	284	305

*Based on October/November 1985 survey, estimated noncaptive consumption, value at factory prices for domestic products and landed cost for imports.

U.S. PRODUCER EXPORTS OF CONNECTORS

($ Millions)

	Value of Exports (Value at Port)	Annual Percent Change	Exports As % Domestic Sales
1972	$ 36.4	-	7.6%
1974	78.7	58.1%	10.0
1976	37.1	-26.5	4.5
1977	95.7	157.9	9.7
1978	154.9	61.8	12.0
1979	208.3	34.5	12.8
1980	257.0	23.4	12.7
1981	263.5	2.5	12.0
1982	250.3	-5.0	11.7
1983	294.9	17.8	11.4
1984	383.4	30.0	12.1
*1985 Estimated	361.0	-5.8	10.5

*Estimated, based on exports data from January-September, 1985.

SOURCE: U.S. Department of Commerce, Current Industrial Reports, Exports by Commodity and Country of Destination, FT 410, Calculations by Marketdata

CONNECTOR EXPORTS, BY KIND

(1980-1984)

Type	Value of Exports ($Thous.)	Annual % Change	Quantity Exported (Units)	Annual % Change	Value of Exports As % Value of U.S. Shipments
Coaxial					
1980	$21,241	-	11,168,782	-	-
1981	22,682	6.8%	11,274,407	0.9%	10%
1982	24,069	6.1	12,039,928	6.8	11
1983	24,066	-	11,381,987	-5.5	11
1984	31,037	29.0	14,974,015	31.6	13
1985 Est.	31,849	2.6	-	-	
Cylindrical, Multi-contact, less than 120 V and 20A					
1980	26,888	-	7,017,215	-	-
1981	23,458	-12.8	7,108,543	1.3	5
1982	24,444	4.2	7,659,085	7.7	6
1983	29,124	19.1	9,572,709	25.0	7
1984	37,375	28.3	15,728,664	64.3	7
1985 Est.	49,450	32.3	-	-	

SOURCE: Bureau of the Census, Current Industrial Reports

CONNECTOR EXPORTS, BY KIND

(CONTINUED)

Type	Value of Exports ($ Thous.)	Annual % Change	Quantity Exported (Units)	Annual % Change	Value of Exports As % Value of U.S. Shipments
Rack and Panel					
1980	$ 50,821	-	I08,479,933	-	-
1981	49,550	- 2.5%	69,559,999	-35.9%	12%
1982	48,623	- 1.9	86,818,165	24.8	12
1983	53,794	10.6	97,285,022	12.1	12
1984	65,499	21.2	91,203,005	- 6.3	14
1985 Est.	60,480	- 7.7	-		
Printed Circuit					
1980	24,208	-	16,195,991	-	-
1981	25,637	5.9	16,600,092	2.5	5
1982	23,429	- 8.6	17,333,418	4.4	5
1983	27,109	15.7	22,129,304	27.7	4
1984	32,128	18.5	19,269,000	-13.0	4
1985 Est.	33,063	2.9	-		
Other Electrical					
1980	133,888	-	593,616,539	-	-
1981	142,219	6.2	718,777,531	21.1	NA
1982	129,777	- 8.7	465,678,170	-34.2	NA
1983	160,834	23.9	744,231,810	59.8	NA
1984	217,397	35.2	1,236,758,422	66.2	NA
1985 Est.	186,199	-14.4	-		

U.S. EXPORTS OF CONNECTORS, BY TYPE, BY PRINCIPAL COUNTRY OF DESTINATION

(1985 Estimates vs. 1980)

($ Thousands)

	Total Value, All Kinds		Percent of Total	
	1985	1980	1985	1980
All Nations, Value	$361,041	$247,189	100.0	100.0
Canada	50,086	20,807	13.9	8.4
Japan	47,496	25,206	13.2	10.2
England	43,697	35,873	12.1	14.5
Mexico	28,273	18,588	7.8	7.5
West Germany	26,822	34,013	7.4	13.8
Netherlands	16,641	-	4.6	-
France	15,821	20,720	4.4	8.4

CYLINDRICAL, MULTI-CONTACT 120V OR MORE, 20A AND OTHER TYPES

	1985	1980
All Nations, Value	$49,450	$35,233
Mexico	13.6%	8.4%
Canada	11.9	6.5
West Germany	7.8	17.0
Japan	7.5	10.0
France	6.2	9.1
Taiwan	4.1	4.0
Cumulative Total %:	51.1	55.0

EXPORTS OF CONNECTORS, BY COUNTRY OF DESTINATION (CONTINUED)

($ Thousands)

Country	Coaxial			Rack and Panel	
All Nations, Value	1985 $31,849	1980* $19,277		1985 $60,480	1980* $46,800
Mexico	20.5%	-	Japan	28.2%	0.7%
Canada	19.1	18.0%	England	21.0	3.1
England	15.4	20.2	West Germany	11.4	18.0
Israel	6.6	-	France	5.9	-
Japan	6.5	5.8	Italy	5.7	19.7
Korea	4.8	-	Canada	3.6	-
Sweden	4.2	-		75.8	41.5
Cumulative Total %:	77.1	44.0			

	Printed Circuit			Miscellaneous Types	
All Nations, Value	1985 $33,063	1980* $22,866		1985 $186,199	1980* $123,593
Canada	18.2%	13.7%	Canada	16.1%	8.5%
West Germany	11.8	15.2	Japan	11.4	12.7
England	10.8	13.3	England	11.2	13.7
Japan	10.1	9.6	Netherlands	8.9	7.5
Singapore	5.7	-	Mexico	7.1	-
Mexico	5.7	5.1	West Germany	6.6	11.5
	62.3	56.9	France	4.9	5.9
				66.2	59.8

*11 months' data, through November, 1980

IMPORTS COMPETITION

TRENDS IN CONNECTOR IMPORTS

($ Millions)

	Value of Imports (Imports for Consumption)	Annual Percent Change	Imports As % Domestic Sales
1976	$ 30.9	-	3.7%
1977	34.4	11.3%	3.5
1978	68.5	99.1	5.3
1979	99.6	45.4	6.1
1980	130.4	30.9	6.5
1981	229.8	76.2	10.4
1982	175.9	76.5	8.2
1983	224.6	27.7	8.7
1984	289.2	28.8	9.1
*1985 Estimated	251.9	-12.9	7.4

*Estimated, based on data from January-August, 1985.

CONNECTOR IMPORTS, BY KIND
(IMPORTS FOR CONSUMPTION)

	Value of Imports ($ Thous.)	Annual % Change	Quantity Imported (Units)	Annual % Change	Value of Imports As % Value of U.S. Shipments
Type					
Coaxial					
1980	$ 1,159	-	2,552,488	-	-
1981	2,164	86.7%	6,323,118	147.7%	1.0%
1982	4,424	104.4	11,587,000	83.2	2.1
1983	7,094	60.3	21,520,000	85.7	3.3
1984	8,962	26.3	15,205,000	-29.3	4.0
1985 Est.	8,358	- 6.7	-	-	
Cylindrical, Multi-contact, less than 120 V and 20A					
1980	28,043	-	144,856,120	-	-
1981	26,791	- 4.5	163,268,818	12.7	5.9%
1982	20,346	-24.1	188,722,000	15.6	5.2
1983	28,510	40.1	239,957,000	27.1	6.9
1984	34,417	20.7	219,990,000	- 8.3	6.9
1985 Est.	41,143	19.5	-	-	

CONNECTOR IMPORTS, BY KIND

(CONTINUED)

	Value of Imports ($ Thous.)	Annual % Change	Quantity Imported (Units)	Annual % Change	Value of Imports As % Value of U.S. Shipments
Type					
Rack & Panel					
1980	$ 2,068	-	1,755,790	-	-
1981	4,249	105.5%	2,228,015	27.0%	1.1%
1982	8,665	103.9	11,154,000	400.6	2.2
1983	8,817	1.8	9,553,000	-14.4	2.1
1984	15,576	76.7	15,680,000	64.1	3.5
1985 Est.	9,007	-42.2	-		
Printed Circuit					
1980	6,499	-	12,954,832	-	-
1981	6,642	2.2	15,860,295	22.4	1.4
1982	12,219	84.0	26,227,000	65.4	2.7
1983	17,546	43.6	40,365,000	53.9	2.9
1984	17,095	- 2.6	27,655,000	-31.5	2.4
1985 Est.	19,320	13.0	-		
Other Electrical					
1980	92,671	-	539,090,173	-	NA
1981	190,004	105.0	1,026,101,976	90.3	NA
1982	130,222	-31.5	956,633,000	-6.8	NA
1983	162,601	24.9	965,425,000	0.9	NA
1984	213,134	31.1	1,131,091,000	17.2	NA
1985 Est.	174,102	-18.3			

U.S. IMPORTS OF CONNECTORS BY TYPE, BY COUNTRY OF ORIGIN
(1985 ESTIMATES VS. 1980)
($ Thousands-Customs Value)

Country	Total Imports, All Kinds	
	1985E	1980*
All Nations, Value	$251,930	$119,318
Mexico	16.9%	21.7%
Japan	13.9	14.3
Canada	13.9	14.4
Taiwan	13.1	13.8
West Germany	8.6	7.4
Haiti	6.0	3.6
France	5.5	6.7

	Cylindrical, Multi-Contact 120V or More, 20A and Other	
	1985E	1980*
All Nations, Value	$41,143	$25,724
Mexico	29.9%	51.2%
Japan	13.6	8.3
Taiwan	11.2	1.2
Canada	8.6	0.9
Italy	7.8	-

IMPORTS OF CONNECTORS, BY COUNTRY OF ORIGIN
(CONTINUED)
($ Thousands)

Country	Coaxial			Rack and Panel	
	1985E	1980*		1985E	1980*
All Nations, Value	$8,358	$995		$9,007	$1,885
Japan	33.6%	15.2%	Canada	46.9%	73.5%
Mexico	20.2	-	France	15.9	-
France	13.3	-	Mexico	5.2	11.4
Taiwan	10.3	26.4			
Switzerland	6.1	16.9			

	Printed Circuit			Miscellaneous Types	
	1985E	1980*		1985E	1980*
All Nations, Value	$19,320	$6,286		$174,102	$84,428
Canada	30.2%	1.3%	Taiwan	15.8%	18.2%
Mexico	19.5	4.8	Japan	14.6	12.3
Thailand	6.9	-	Mexico	13.9	12.3
England	6.9	-	Canada	12.4	18.2
Japan	6.4	68.1	West Germany	11.1	9.1
West Germany	5.9	4.0	Haiti	7.9	4.8
			England	5.3	-

E- Estimate, based on imports from January-August, 1985

*11 months' data, through November, 1980

SOURCE: U.S. Department of Commerce, U.S. General Imports and Imports For Consumption, FT 135, Commodity by Country

THE PRICE SITUATION

The average increase in the price of all connectors as a whole rose 3% by December, 1985, about the same as the 2.9% rise in 1984. In fact, due to competitive conditions within the industry and inroads by semiconductor devices (ICs) replacing some kinds of connectors, producer prices rose by only 3.1% or less each year from 1981-85. The big price increases were experienced during 1979-80 (11% and 12.5%).

By specific product line, subminiature cylindrical connectors and integral shell rack and panel devices' prices rose fastest in 1985 - 4.1%. Coaxial connector prices were up 3.1%, while most other lines' prices rose very moderately - 1.3%-1.8%. High density and standard cylindrical connector prices actually dropped 3.3% during 1985.

Most of the product categories tracked by the Bureau of Labor Statistics now are more detailed than prior to 1980. Most of the indexes are now based on a 1980=100 level.

Several years ago, during the early 1980's, the rising price of gold was the major issue in determining the cost of producing connectors. Gold had reached $850 per ounce by the Fall of 1979 and interconnection companies were adding on gold surcharges. Interconnection firms consume more gold than does any other segment of the electronics industry. Because gold has excellent conductivity and corrosion resistance, it is unlikely that it will ever be replaced in component manufacturing, although efforts have been made to reduce consumption via selective plating and other techniques. As gold prices have dropped to the $300-350 level prevalent today, it becomes less significant a cost factor. But, gold prices are volatile, dependent to a large degree on psychology and world political stability or instability. Therefore, any

efforts to reduce consumption by connector companies are wise as "insurance policies" to protect profit margins.

Following is an indication of the gold usage pertaining to various electronic components.

U.S. GOLD USE IN ELECTRONIC AND ELECTRICAL APPLICATIONS BY COMPONENT

(Metric Tons)

	1980	1981	1982
Connectors	14.8	13.4	10.6
Semiconductors	7.8	6.9	6.5
Printed Circuits	5.8	6.0	5.3
Relays and Switches	2.0	1.7	1.4
Electron Tubes	1.2	1.1	1.1
Other, including thin and thick film metallization	7.0	6.6	6.0
TOTAL	38.6	35.7	30.9

SOURCE: International Gold Corp.

Connector suppliers continue to use various approaches to cut down usage of gold, such as selective plating (the most popular method), as well as gold inlay, gold dot, thinner plating, cladding, and more recently, various alloy combinations. The success of these methods differs from company to company, with some claiming to cut gold use 50% over the last few years, others making more modest improvements.

Industry sources state that there is no such thing as universal selective plating for all applications. Each area of application has its own criteria, depending on how and where it's used, the length of shelf life, accessibility once in use, etc.

During the recession years of 1980-82, prices came under increasing pressure due to soft demand, as well as increasing competition from a growing number of suppliers. In some cases the average selling prices dropped as much as 30% on specific product lines. Larger firms are in a better position concerning price competition and maintaining profits. They make manufacturing improvements, which due to the size of their production runs, enable them to control costs more effectively.

For pricing, virtually all suppliers weigh their internal costs against the reality of the market, and make adjustments on those products where they enjoy either a proprietary advantage or a market advantage. On standard, across-the-board products competition is usually so severe that price increases are hard to implement.

As of 1983, almost 80% of AMP's business was "noncontractual" - affected by announced price increases. At that time, AMP personnel stated that the difference between those prices and "negotiated" prices was getting bigger, thereby making the ratio of sales covered by long-term contracts and those sold otherwise critical to maintaining profitability.

PRODUCER PRICE TRENDS, BY TYPE CONNECTOR
(INDEX 1967=100, UNLESS OTHERWISE NOTED)

Data Not Seasonally Adjusted

	Total, All Types	Coaxial (Radio Frequency & Above	Cylindrical H.D. & Std.)	Miniature Cylindrical
1973	112.8	114.0	- 107.0	-
1974	126.0	132.8	- 122.5	-
1975	109.6	97.3	- 135.1	-
1976	143.2	146.8	- 147.7	-
1977	153.5	160.8	- 161.3	-
1978	166.8	180.7	- 180.3	-
1979	185.2	202.3	- 213.9	-
1980	208.4	223.1 (1)	- 248.9	-
1981	214.8	236.4	108.2 (2)	104.9 (2)
1982	219.4	243.4	111.4	107.3
1983	222.6	253.2	109.1	105.5
1984	229.1	268.2	111.9	105.3
1985				
Jan.	232.7	272.7	113.5	105.7
May	232.9	273.0	106.5	105.7
July	233.4	273.0	107.8	105.7
Sept.	235.1	276.1	107.9	106.2
Dec.	235.9	276.4	108.2	107.2

SOURCE: Bureau of Labor Statistics

PRODUCER PRICE TRENDS, BY TYPE CONNECTOR

(CONTINUED)

	Subminiature Cylindrical	Rack & Panel, Integral Shell and Similar	Rack and Panel, Rectangular Subminiature	Printed Circuit, One-Piece	Printed Circuit, Two-Piece	Miscellaneous Special Purpose
1973	-	122.1	-	-	101.9	-
1974	-	131.8	-	-	108.8	-
1975	-	113.7	-	-	127.5	-
1976	-	141.1	-	-	118.7	-
1977	-	147.8	-	-	125.8	-
1978	-	156.9	-	-	132.5	-
1979	-	164.2	-	-	141.8	-
1980	-	174.9	-	-	161.2	-
1981	104.4[2]	-	99.9[2]	165.2[3]	99.9[2]	100.1[2]
1982	107.0	201.4	105.9	164.0	101.1	99.7
1983	109.8	204.6	108.8	165.1	95.7	101.5
1984	110.5	207.5	110.2	167.9	95.7	104.1
1985						
Jan.	112.8	207.6	110.7	168.9	NA	104.5
May	112.8	207.6	110.7	169.3	NA	105.2
July	112.8	209.0	111.7	169.3	NA	105.2
Sept.	114.4	209.0	111.7	170.5	97.9	106.0
Dec.	115.0	216.0	111.7	170.5	96.9	106.0

(1) 1968=100

(2) 1980=100

(3) 1972=100

NA - Data not available

ECONOMIC STRUCTURE OF THE U.S. ELECTRONIC CONNECTORS INDUSTRY

Every five years, with years ending in a 2 or 7, the United States Census Bureau/Department of Commerce conducts a major survey of the size, composition and operating performance of a wide variety of manufacturing sectors. The SIC (Standard Industrial Classification) Code is used to collect and process the data. The code 3678 is used for manufacturers of electronic connectors. Breaking the data down into finer detail, by 5-digit SIC, one can obtain product line data within that industry (i.e. 36781 = coaxial connectors). In between the 5-year census survey a less detailed "Annual Survey of Manufactures" or "Current Industrial Report" is conducted. These Government surveys provide the information found in the following section - truly a wealth of statistical operating information about the industry's facilities and workers. 1983 is the most recent year for which such data is now available.

GENERAL INDUSTRY STATISTICS

By year-end 1983, United States producers had shipped $2.89 billion of connector devices, up 13% over the prior year. Shipments have risen every year except 1975 (during the last severe recession) since 1972, and average yearly growth since 1979 has been 13.7%. About 150 companies operate nearly 200 production plants nationwide. These facilities employed 36,700 workers in 1983, 73% of which were production workers earning $7.99 per hour. Employment peaked at 39,700 workers during 1982. The industry's payroll costs amounted to about $698 million in 1983. The cost of purchased materials was $1.04 billion, so that total operating costs represented 65% of each sales dollar, a historically high figure for the industry, but less than the 77-78% average for all United States manufacturing plants as a whole.

The industry's "primary" product is, of course, electronic connectors. However, other products are also made by connector plants. The "specialization ratio" measures the degree to which plants concentrate on their primary product. In 1982 this ratio stood at 87%, up sharply from 78% during 1977. The "coverage ratio" measures the percent of product sales accounted for by this industry's plants (vs. connectors made by other industrial sector's facilities). This ratio also rose, from 86% to 91% between 1977 and 1982.

Connector producers invested $146.7 million in new capital expenditures for buildings, plant and equipment in 1983. This was a 13% drop from 1982, but still relatively high by historical levels. 77% of capital investment was allocated to new machinery and equipment, with 23% to new structures and additions to physical plant. Since the early 1980's, capital investment has been strong, rising from a level of 3.5-4.0% of annual industry sales to 5-6%. Relative to the "gross book value of depreciable assets", capital expenditures constituted 16.7% in 1983. This level was as high as 31.4% during 1980. Capital investment relative to "value added by manufacture" has also risen sharply, to 7.8% by 1983 (compared to about 5% in the late 1970's). Perhaps much of this new investment has been allocated to new offshore production facilities and equipment in the Far East, the Caribbean, and Mexico.

United States Connector producers held $590 in end-of-year inventories in 1983, down 2.2% from 1982. Typically, 45% of this is "work-in-process", while "finished products" account for another 25-30%, and "material and supplies" the remainder. This industry historically holds slightly more inventory on hand than the average United States electric and electronic equipment plant. The inventory/shipments ratio (derived by dividing year-end inventory by average monthly shipments) stood at 2.44 by 1983 (vs. 2.37 for all electronic equipment plants). During recessionary

periods, as in 1974-75, this ratio will rise as sales slump and involuntary inventory build-ups take place. This is exactly what occurred in 1974-75, as the ratio rose to 2.95 and 2.91 respectively.

THE LABOR SITUATION

Strong market growth propelled the industry's labor rolls to 39,700 workers by 1982, but it dropped slightly to 36,700 the following year. The industry's 26,000 + production workers earned an average of $7.99 hourly in 1983, only a 3.5% rise from the prior year and continuing a slowdown in wage escalation that hit 13.6% pay raises in the early 1980's.

Value added per employee rose to $51,226 by 1983, a new high. Value added per production worker man-hour also reached a record $35.74, up 18.6%. A measure of productivity is the value added/wage ratio. This ratio rose to a near-record 4.47 by 1983 (The high being 4.54 in 1978), a very good sign. This is significantly higher than the "all electronic equipment" plant average of 3.90.

The overwhelming share of total labor costs of $857 million in 1983 went to pay salaries and wages (81%), followed by employer benefits programs (11.5%), and Social Security and other legally required payments (7%).

OPERATING STATISTICS BY PLANT SIZE

About 50% of all connector plants in 1982 employed from 50-500 workers. Only 20 employed more, and 2 of the 2,500+ size. These medium-sized facilities generated 49% of total industry shipments, were responsible for investing nearly 42% of total industry capital expenditures, employed 46% of all workers, and held 44% of total inventories.

Plants of the 500-999 employee size had the highest sales per employee at $76,802, followed closely by 50-99 worker facilities with $72,542. Generally, larger plants had higher inventory/shipments ratios, the highest being 3.58 for 2,500+ worker plants. Small plants employing 10-19 people had a ratio of 1.52. It is undoubtedly more critical for smaller operations to closely control inventory levels, as high interest rates of the early 1980's made this a necessity. Not surprisingly, average shipments per establishment were highest at nearly $81 million for the largest plants employing 1,000+ workers.

Capital investment relative to value added and related to sales was highest for plants of the 100-249 worker and 1,000+ worker size (13.3% for the latter for capital investment as % value added in 1982.).

THE GEOGRAPHIC SITUATION

Geographic/state data from the Census Bureau is always spotty at best; many states' information is withheld to avoid disclosure of specific company operations. However, from the data that is available, several states appear to be areas of connector production concentration. A total of 54 plants are located in California, followed by Pennsylvania with 19, Massachusetts with 17, Connecticut with 15, Illinois with 14, and New York with 13. In the same order, these states account for 25.1%, 18.8%, 4.7%, 6.7%, 9.2%, and 7.3% of total industry sales - a combined total of 71.4% of industry output in 1982.

Pennsylvania and Connecticut-based plants had the lowest operating rates (55.1% and 64.2%) of the group, as measured by payroll and materials costs as a percent of sales. Texas-based facilities also had low operating costs at 67.7% of sales. The highest costs were associated with New York plants - 91.8% of sales.

PRIMARY PRODUCT CLASS SPECIALIZATION

A further analysis provided by the Census Bureau is a breakdown by major connector product line of the various economic operating statistics available for the industry as a whole. A comparison is made between the "entire industry" and plants specializing 75% or more of their output in a particular line such as PC or rack and panel type connectors. These tables are presented toward the end of this section.

THE ELECTRONIC CONNECTORS INDUSTRY
INDUSTRY - PRODUCT ANALYSIS
SPECIALIZATION AND COVERAGE RATIOS
($ Millions)

Value of Industry Shipments	1972	1977	1982
Total	$483.3	$1,104.6	$2,565.0
Primary Products	422.2	844.1	2,151.2
Secondary Products	52.8	242.0	323.3
Specialization Ratio (Primary products ÷ primary and secondary products)	89%	78%	87%
Miscellaneous Receipts	8.3	18.5	90.5
Value of Primary Product Shipments			
Total, Made in All Industries	523.6	986.4	2,353.3
Made in This Industry	422.2	844.1	2,151.2
Made in Other Industries	101.4	142.3	202.1
Coverage Ratio (Percent of product shipments accounted for by this industry's plants)	81%	86%	91%

SOURCE: CENSUS OF MANUFACTURES

THE ELECTRONIC CONNECTORS INDUSTRY
GENERAL INDUSTRY STATISTICS FOR
MANUFACTURING PLANTS

	Number of Establishments	Number of Companies	Number of Employees (Thous.)	Value of Industry Shipments ($ Millions)	Average Shipments Per Establishment ($ Millions)
1972	92	75	18.1	$ 483.3	$ 5.25
1973	NA	NA	23.4	653.8	-
1974	NA	NA	24.7	776.2	-
1975	NA	NA	22.9	772.6	-
1976	NA	NA	22.1	846.0	-
1977	133	109	26.0	1,104.6	8.31
1978	NA	NA	30.2	1,417.1	-
1979	NA	NA	34.4	1,872.8	-
1980	NA	NA	37.0	2,269.0	-
1981	NA	NA	35.3	2,310.9	-
1982	198	148	39.7	2,565.0	12.95
1983	NA	NA	36.7	2,899.0	-

NA - Data not available

SOURCE: Census and Annual Surveys of Manufactures, Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY
GENERAL INDUSTRY STATISTICS FOR MANUFACTURING PLANTS

(Table Continued)

	Materials Costs (Mill.)	Payroll Costs ($ Mill.)	New Capital Expenditures ($ Mill.)	Gross Book Value of Fixed Assets ($ Mill.)	Value of End-of-Year Inventory ($ Mill.)
1972	$ 141.0	$141.2	$ 12.2	$153.5	$ 95.5
1973	226.0	194.4	17.9	178.8	139.7
1974	259.1	224.2	26.6	201.6	191.2
1975	245.6	232.7	27.3	243.1	187.2
1976	277.8	242.3	26.1	265.9	199.1
1977	371.7	303.6	10.4	NA	234.5
1978	472.6	385.6	51.6	361.0	311.0
1979	643.7	465.5	71.0	393.9	417.3
1980	827.0	542.8	140.9	448.6	487.3
1981	827.0	570.3	117.8	564.4	489.0
1982	974.9	687.5	168.7	773.9	603.8
1983	1,042.5	697.9	146.7	878.5	590.3

NA - Data not available

SOURCE: Census and Annual Surveys of Manufactures, Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY

OPERATING COST ANALYSIS

As A Percent of Value of Shipments

	Payroll Costs	Materials Costs	Total Operating Costs
1972	29%	29%	58%
1973	30	34	64
1974	29	33	62
1975	30	31	61
1976	29	32	61
1977	28	33	61
1978	27	33	60
1979	25	34	59
1980	24	36	60
1981	25	36	61
1982	27	38	65
1983	24	36	60

NA - Data not available

SOURCE: Census and Annual Surveys of Manufactures, Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY
VALUE OF MATERIALS CONSUMED, BY TYPE

(DELIVERED COST - MILLION $)

	1972	1977	1982
Carbon steel (sheet, strip, bars, shapes, wire, etc.)	$ 3.4	$ 3.1	$ 3.0
Alloy and stainless steel	2.1	9.7	12.3
Insulated wire and cable	2.9	3.0	4.2
Copper and copper base alloy: (bare wire, rod, bar, mechan. wire, plate, sheet, strip, tube, pipe)	21.0+	39.4+	76.3
Aluminum and aluminum base alloy: (sheet, plate, foil, shapes and forms)	5.7+	7.0+	18.5
Castings, aluminum, purchases	1.9	1.2	4.2
Precious metals, all forms	-	32.1	110.1
Transistors, diodes, rectifiers, purchased	-	.6	-
Germanium	-	.1	-
Paper and paperboard containers	1.9	.9	6.9
Electronic capacitors	-	.6	-
Electronic resistors	-	.2	-
Electronic coils, transformers, reactors, chokes	-	.1	-
Electronic components (slide switches, PCB's, antennas, modules, dial assemblies, etc.)	-	16.4	26.1
Current-carrying wiring devices	-	4.1	3.7
Plastic resins (granules, pellets, powders, liquids, etc.)	9.3	12.1	21.5
Bolts, nuts, screws, rivets	5.0	12.0	26.8
Special dies, tools, die sets, jigs, fixtures	5.0	3.9	NA
Metal stampings	4.0	12.2	34.4
All other materials and components, parts, containers	34.4	128.8	180.1
Materials, parts, containers, supplies, not specified by kind	18.0	50.5	303.8
TOTAL:	135.5	343.2	856.1

NA - Data not available

THE ELECTRONIC CONNECTORS INDUSTRY

CAPITAL INVESTMENT TRENDS

($ Millions)

New Plant and Equipment

	Total	Annual % Change	New Structures and Additions to Plant (Percent of Total)	New Machinery and Equipment (Percent of Total)	Used Plant and Equipment (Mill. $)
1972	$ 12.2	-	9.8%	90.2%	
1973	17.9	46.7%	22.0	78.0	
1974	26.6	48.6	14.7	85.3	
1975	27.3	2.6	16.8	83.2	
1976	26.1	-4.4	15.9	84.1	
1977	40.4	54.8	9.7	90.3	$ 2.7
1978	51.6	27.7	21.1	78.9	4.3
1979	71.0	37.6	20.7	79.2	1.7
1980	140.9	98.5	24.9	75.1	3.7
1981	117.8	-16.4	17.3	82.7	3.5
1982	168.7	43.2	25.7	74.3	12.1
1983	146.7	-13.0	23.1	76.9	2.5

SOURCE: Census and Annual Survey of Manufactures, Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY

CAPITAL INVESTMENT TRENDS

(CONTINUED)

	Capital Expenditures As % of Industry Shipments	Capital Expenditures As % of Fixed Assets	Capital Expenditures As % of Value Added
1972	2.5%	7.9%	3.5%
1973	2.7	10.0	4.0
1974	3.4	13.2	4.8
1975	3.5	11.2	5.4
1976	3.1	9.8	4.6
1977	3.6	NA	5.4
1978	3.6	14.3	5.2
1979	3.8	18.0	5.4
1980	6.2	31.4	9.6
1981	5.1	20.9	7.8
1982	6.6	21.8	10.3
1983	5.1	16.7	7.8

THE ELECTRONIC CONNECTORS INDUSTRY

INVENTORY TRENDS

($ Millions)

	Value of End-of-Year Inventory	Annual % Change	As A Percent Total: Finished Products	Work In Process	Materials, Supplies, Fuels, Etc.
1972	$ 95.5	-	20.6%	58.2%	21.3%
1973	139.7	46.3%	18.6	60.1	21.3
1974	191.2	36.9	NA	NA	NA
1975	187.2	-2.1	22.9	54.7	22.4
1976	204.8	9.4	25.4	52.2	22.4
1977	234.5	17.8	24.4	52.5	23.1
1978	311.0	32.6	24.8	52.9	22.4
1979	417.3	34.2	23.1	52.5	24.3
1980	487.3	16.8	25.9	44.3	29.8
1981	489.0	0.3	27.6	42.8	29.6
1982	603.8	23.5	29.7	46.3	24.0
1983	590.3	-2.2	———	NA	———

NA - Data not available

SOURCE: Annual Surveys of Manufactures,
Marketdata Calculations

INVENTORY/SHIPMENTS RATIO*
CONNECTORS INDUSTRY COMPARED TO
ALL ELECTRIC AND ELECTRONIC EQUIPMENT SECTOR

	Connectors Industry	All Electric and Electronic Equipment Average
1972	2.37	2.19
1973	2.56	2.34
1974	2.95	2.51
1975	2.91	2.36
1976	2.82	2.22
1977	2.55	2.18
1978	2.63	2.21
1979	2.67	2.33
1980	2.58	2.37
1981	2.54	2.38
1982	2.82	2.43
1983	2.44	2.37

*Derived by dividing year-end inventories by average monthly industry shipments.

SOURCE: Census and Annual Surveys of Manufactures, Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY

LABOR TRENDS

	Number of Employees (Thousand)	Industry Payroll (Mill.)	Payroll Per Employee (Dollars)	Assets Per Employee (Dollars)	Value Added Per Employee (Dollars)
1972	18.1	$141.2	$ 7,801	$ 8,480	$19,093
1973	23.4	194.4	8,307	7,641	19,230
1974	24.7	224.2	9,076	8,161	22,222
1975	22.9	232.7	10,161	10,615	21,960
1976	22.1	242.3	10,963	12,031	25,945
1977	26.0	303.6	11,676	NA	29,054
1978	30.2	385.6	12,768	11,953	33,000
1979	34.4	465.5	13,532	11,450	37,968
1980	37.0	542.8	14,670	12,124	39,749
1981	35.3	570.3	16,156	15,988	43,011
1982	39.7	687.5	17,317	19,493	41,146
1983	36.7	697.9	19,016	23,937	51,226

NA - Data not available

SOURCE: Census and Annual Surveys of Manufactures, Marketdata Calculations

LABOR TRENDS (CONTINUED)

PRODUCTION WORKER STATISTICS

	Production Workers As % Total Employment	Average Hourly Earnings (Dollars)	Annual Percent Change	Value Added Per Production Worker Man-Hour	Annual Percent Change
1972	74	$3.36	-	$12.89	-
1973	74	3.50	4.2%	12.71	- 1.4%
1974	72	3.82	9.1	15.28	20.2
1975	70	4.35	13.9	16.01	4.8
1976	71	4.63	6.4	18.55	15.9
1977	73	4.92	6.3	20.07	8.2
1978	74	5.49	11.6	22.96	14.4
1979	74	5.74	4.6	26.07	13.5
1980	74	6.33	10.3	27.34	4.9
1981	71	7.19	13.6	30.55	11.7
1982	71	7.72	7.4	30.14	- 1.3
1983	73	7.99	3.5	35.74	18.6

SOURCE: Census and Annual Surveys of Manufactures, Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY

LABOR PRODUCTIVITY TRENDS

PRODUCTION WORKERS

	Value Added Per Production Worker Man-Hour	Average Hourly Wages	Value Added-Wage Ratio
1972	$12.89	$3.36	3.84
1973	12.71	3.50	3.63
1974	15.28	3.82	4.06
1975	16.01	4.35	3.68
1976	18.55	4.63	4.01
1977	20.07	4.92	4.08
1978	22.96	5.49	4.18
1979	26.07	5.74	4.54
1980	27.34	6.33	4.32
1981	30.55	7.19	4.25
1982	30.14	7.72	3.90
1983	35.74	7.99	4.47

ALL ELECTRIC AND ELECTRONIC EQUIPMENT AVERAGE

1972	$13.44	$3.88	3.46
1973	13.97	4.07	3.43
1974	15.45	4.40	3.51
1975	17.87	4.94	3.62
1976	20.01	5.22	3.83
1977	NA	NA	NA
1978	23.20	6.03	3.84
1979	25.68	6.41	4.00
1980	29.35	7.13	4.12
1981	32.49	7.82	4.15
1982	37.29	8.49	4.39
1983	40.53	10.38	3.90

SOURCE: Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY

COMPOSITION OF LABOR COSTS

($ Millions)

	Total Labor Costs	Percent For: Salaries and Wages	Social Security and Other Legally Required Payments	Employer Benefits Programs
1972	$163.3	86.5%	6.3%	7.2%
1973	223.9	86.8	6.7	6.5
1974	262.4	85.4	7.9	6.7
1975	273.7	85.0	7.3	7.7
1976	289.6	83.7	6.6	9.7
1977	361.8	83.9	7.3	8.8
1978	461.4	83.6	6.9	9.5
1979	562.9	82.7	7.2	10.1
1980	653.1	83.1	7.0	9.9
1981	684.4	83.3	7.2	9.5
1982	834.9	82.3	7.0	10.6
1983	857.1	81.4	7.1	11.5

SOURCE: Annual Surveys of Manufactures,
Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY

INDUSTRY STATISTICS BY EMPLOYMENT SIZE OF ESTABLISHMENT

1982

Plants With An Average of:	Number of Establishments	All Employees: Number (Thou.)	All Employees: Payroll ($ Mill.)	Production Workers: Number (Thou.)	Production Workers: Hours (Mill.)	Production Workers: Wages ($ Mill.)
1-4 Employees	14	(Z)	$ 0.3	(Z)	(Z)	$ 0.2
5-9	9	0.1	0.8	(Z)	0.1	0.6
10-19	16	0.2	3.8	0.2	0.3	2.2
20-49	41	1.3	21.7	1.0	1.9	13.6
50-99	33	2.4	34.7	1.7	3.3	21.8
100-249	37	5.9	93.3	4.4	8.8	60.5
250-499	28	10.1	168.6	7.8	14.4	105.2
500-999	16	11.6	213.5	8.6	16.3	133.4
1,000-2,499	2	8.0	150.8	4.2	9.1	81.0
2,500 or more	2	(D)	(D)	(D)	(D)	(D)

	Value Added By Manufacture ($ Million)	Materials Costs ($ Million)	Value of Shipments ($ Million)	New Capital Investment ($ Million)	End-of Year Inventories ($ Million)
1-4 Employees	$ 1.1	$ 0.6	$ 1.7	$ 0.1	$ 0.4
5-9	1.8	1.3	3.1	0.1	0.6
10-19	7.6	5.0	12.6	0.8	1.6
20-49	48.8	28.0	75.0	4.4	14.1
50-99	104.8	69.5	174.1	5.2	32.8
100-249	246.1	153.2	387.9	29.5	75.2
250-499	451.8	253.9	695.8	35.9	157.3
500-999	573.3	344.3	890.9	66.3	225.3
1,000-2,499	198.2	119.1	323.9	26.3	96.5
2,500 or more	(D)	(D)	(D)	(D)	(D)

(Z) Less than $50,000 or hours, under 50 employees

(D) Withheld to avoid disclosure of individual firms, data for this item included in figure directly above.

SOURCE: Census of Manufactures

THE ELECTRONIC CONNECTORS INDUSTRY

INDUSTRY STATISTICS BY EMPLOYMENT SIZE OF ESTABLISHMENT

1982

Avg. Employment Size of Plant	Payroll and Mtls. As % Value of Shipments	Avg. Shipment Per Establish. ($ Thous.)	Payroll Per Employee (Dollars)	Value Added Per Employee (Dollars)
1-4	52.9%	$ 121.4	-	-
5-9	67.7	344.4	$ 8,000	$18,000
10-19	69.8	787.5	19,000	38,000
20-49	66.3	1,839.3	16,692	37,538
50-99	59.9	5,275.8	14,458	43,667
100-249	63.5	10,483.8	15,814	41,712
250-499	60.7	24,850.0	16,693	44,733
500-999	62.6	55,681.3	18,405	49,422
1,000-2,499 2,500 or more	-	80,975.0	18,850	24,775

	Shipments Per Employee (Dollars)	Inventory-Shipments Ratio*	Capital Investment As % of Value Added	Capital Investment As % of Shipments
1-4	-	2.82	9.1%	5.9%
5-9	$31,000	2.32	5.6	3.2
10-19	63,000	1.52	10.5	6.3
20-49	57,692	2.26	9.0	5.9
50-99	72,542	2.26	5.0	3.0
100-249	65,746	2.33	12.0	7.6
250-499	68,891	2.71	7.9	5.2
500-999	76,802	3.03	11.6	7.4
1,000-2,499 25,00 or more	40,488	3.58	13.3	8.1

* Derived by dividing year-end inventory by average monthly shipments

SOURCE: Census of Manufactures, Marketdata Calculations

THE ELECTRONIC CONNECTORS INDUSTRY

INDUSTRY ECONOMIC STATISTICS BY STATE*

1982

State	Number of Estab.	Number of Employees (Thous.)	Payroll ($ Mill.)	Payroll Per Employee (Dollars)	Value of Shipments ($ Mill.)	Shipments Per Employee (Dollars)	Average Shipments Per Establishment ($ Million)
Arizona	4	-	-	-	-	-	-
Arkansas	1	-	-	-	-	-	-
California	54	11.7	$211.2	$18,051	$644.7	$ 55,102	$11.94
Connecticut	15	2.9	47.6	16,413	172.6	59,517	11.51
Florida	5	0.5	6.7	13,400	23.4	46,800	4.68
Illinois	14	3.8	65.8	17,315	236.5	62,236	16.89
Indiana	4	-	-	-	-	-	-
Massachusetts	17	2.2	37.2	16,909	121.5	55,227	7.15
Minnesota	3	-	-	-	-	-	-
Missouri	2	-	-	-	-	-	-
New Hampshire	3	-	-	-	-	-	-
New Jersey	5	0.3	3.8	12,666	11.8	39,333	2.36
New York	13	5.3	85.8	16,188	187.9	35,452	14.45
North Carolina	7	-	-	-	-	-	-
Ohio	5	-	-	-	-	-	-
Oklahoma	2	-	-	-	-	-	-
Pennsylvania	19	4.7	89.4	19,021	481.6	102,468	25.35
South Carolina	2	-	-	-	-	-	-
Texas	7	0.7	8.7	12,428	31.6	45,142	4.51
Virginia	2	-	-	-	-	-	-

*Note: Many states' information has been withheld to avoid disclosing operations of individual firms. The above states are the only ones for which census data is available.

THE ELECTRONIC CONNECTORS INDUSTRY

INDUSTRY ECONOMIC STATISTICS BY STATE

1982

(Table Continued)

State	Production Workers				Value Added By Manufacture ($ Million)	Value Added Per Employee (Dollars)
	Number (Thous.)	As A % Total Employees	Hours (Million)	Wages (Million)		
Arizona	-	-	-	-	-	-
Arkansas	-	-	-	-	-	-
California	7.9	28.2%	14.7	$115.6	$159.7	$13,649
Connecticut	2.2	7.9	4.6	33.3	48.6	16,758
Florida	0.5	1.8	1.1	5.8	11.4	22,800
Illinois	2.3	8.2	4.2	33.0	66.4	17,473
Indiana	-	-	-	-	-	-
Massachusetts	1.5	5.3	3.1	17.3	15.1	6,863
Minnesota	-	-	-	-	12.8	-
Missouri	-	-	-	-	-	-
New Hampshire	-	-	-	-	-	-
New Jersey	0.2	0.7	0.4	2.2	8.1	27,000
New York	2.8	10.0	6.3	50.5	101.1	19,075
North Carolina	-	-	-	-	-	-
Ohio	-	-	-	-	7.6	-
Oklahoma	-	-	-	-	-	-
Pennsylvania	4.0	14.3	7.2	64.4	193.2	41,106
South Carolina	-	-	-	-	-	-
Texas	0.5	1.8	1.0	6.0	-	-
Virginia	-	-	-	-	-	-

THE ELECTRONIC CONNECTORS INDUSTRY

INDUSTRY ECONOMIC STATISTICS BY STATE

1982

(Table Continued)

State	Cost of Materials ($ Mill.)	Payroll and Materials As % Sales	Capital Expenditures ($ Million)	Capital Expenditures As A % Value Added	Capital Expenditures As A % of Shipments
Arizona	-	-	-	-	-
Arkansas	-	-	-	-	-
California	$223.0	67.3%	$37.6	23.5%	5.8%
Connecticut	63.3	64.2	24.2	49.8	14.0
Florida	9.5	69.2	1.4	12.3	6.0
Illinois	114.6	76.3	11.0	16.6	4.6
Indiana	-	-	-	-	-
Massachusetts	51.6	73.1	9.8	64.9	8.1
Minnesota	-	-	-	-	-
Missouri	-	-	-	-	-
New Hampshire	-	-	-	-	-
New Jersey	5.1	75.4	0.4	4.9	3.4
New York	86.7	91.8	12.2	12.1	6.5
North Carolina	-	-	-	-	-
Ohio	-	-	-	-	-
Oklahoma	-	-	-	-	-
Pennsylvania	176.0	55.1	24.1	12.5	5.0
South Carolina	-	-	-	-	-
Texas	12.7	67.7	1.0	-	3.2
Virginia	-	-	-	-	-

THE ELECTRONIC CONNECTORS INDUSTRY

PLANT STATISTICS BY INDUSTRY AND PRIMARY PRODUCT

CLASS SPECIALIZATION

TOTAL INDUSTRY

	Number of Establishments	Number of Employees (Thous.)	Payroll ($ Mill.)	Payroll Per Employee (Dollars)	Production Workers: Number (Thous.)	Production Workers: Wages ($ Mill.)	Value of Shipments ($ Mill.)	Shipment Per Employee (Dollars)
Entire Industry	198	39.7	$687.5	$17,317	28.0	$418.4	$2,565.0	$64,609
Establishments with 75% Specialization or More	172	31.6	546.1	17,282	22.1	332.0	1,951.2	61,746

	Value Added ($ Mill.)	Value Added Per Employee (Dollars)	Cost of Materials ($ Mill.)	Payroll & Materials As % Sales	New Capital Expenditures ($ Millions)	Capital Expenditures as A % Value Added
Entire Industry	$1,633.5	$41,146	$974.9	64.8%	$168.7	10.3%
Establishments with 75% Specialization or More	1,262.5	39,952	730.2	65.4	114.9	9.1

SOURCE: CENSUS OF MANUFACTURES, MARKETDATA CALCULATIONS

THE ELECTRONIC CONNECTORS INDUSTRY

PLANT STATISTICS BY INDUSTRY AND PRIMARY PRODUCT CLASS SPECIALIZATION

PRINTED CIRCUIT CONNECTORS

	Number of Establishments	Number of Employees (Thous.)	Payroll ($ Mill.)	Payroll Per Employee (Dollars)	Production Workers: Number (Thous.)	Production Workers: Wages ($ Mill.)	Value of Shipments ($ Mill.)	Shipment Per Employee (Dollars)
Entire Industry	34	7.1	$128.8	$31,353	5.4	$80.7	$551.6	$77,690
Establishments with 75% Specialization or More	19	2.1	39.5	18,809	1.8	27.6	176.3	83,952

	Value Added ($ Mill.)	Value Added Per Employee (Dollars)	Cost of Materials ($ Mill.)	Payroll & Materials As % Sales	New Capital Expenditures ($ Millions)	Capital Expenditures as A % Value Added
Entire Industry	$371.2	$52,281	$186.7	57.2%	$30.7	8.3%
Establishments with 75% Specialization or More	119.0	56,666	60.7	56.8	8.6	7.2

SOURCE: CENSUS OF MANUFACTURES, MARKETDATA CALCULATIONS

THE ELECTRONIC CONNECTORS INDUSTRY

PLANT STATISTICS BY INDUSTRY AND PRIMARY PRODUCT CLASS SPECIALIZATION

RACK AND PANEL CONNECTORS

					Production Workers			
	Number of Establishments	Number of Employees (Thous.)	Payroll ($ Mill.)	Payroll Per Employee (Dollars)	Number (Thous.)	Wages ($ Mill.)	Value of Shipments ($ Mill.)	Shipment Per Employee (Dollars)
Entire Industry	19	7.8	$137.6	$17,641	5.8	$86.9	$544.0	$69,743
Establishments with 75% Specialization or More	10	1.3	18.9	14,538	1.2	14.9	123.3	94,856

	Value Added ($ Mill.)	Value Added Per Employee (Dollars)	Cost of Materials ($ Mill.)	Payroll & Materials As % Sales	New Capital Expenditures ($ Millions)	Capital Expenditures as A % Value Added
Entire Industry	$341.4	$43,769	$203.8	62.8%	$51.7	15.1%
Establishments with 75% Specialization or More	89.5	68,846	38.4	46.5	-	-

SOURCE: CENSUS OF MANUFACTURES, MARKETDATA CALCULATIONS

THE ELECTRONIC CONNECTORS INDUSTRY

PLANT STATISTICS BY INDUSTRY AND PRIMARY PRODUCT CLASS SPECIALIZATION

CYLINDRICAL CONNECTORS

	Number of Establishments	Number of Employees (Thous.)	Payroll ($ Mill.)	Payroll Per Employee (Dollars)	Production Workers: Number (Thous.)	Production Workers: Wages ($ Mill.)	Value of Shipments ($ Mill.)	Shipment Per Employee (Dollars)
Entire Industry	20	7.4	$120.8	$16,324	4.3	$71.3	$354.8	$47,945
Establishments with 75% Specialization or More	14	6.5	108.7	16,723	3.6	62.0	300.5	46,230

	Value Added ($ Mill.)	Value Added Per Employee (Dollars)	Cost of Materials ($ Mill.)	Payroll & Materials As % Sales	New Capital Expenditures ($ Millions)	Capital Expenditures as A % Value Added
Entire Industry	$199.7	$26,986	$170.4	82.1%	$16.5	8.3%
Establishments with 75% Specialization or More	169.3	26,046	140.1	82.8	14.5	8.6

SOURCE: CENSUS OF MANUFACTURES, MARKETDATA CALCULATIONS

THE ELECTRONIC CONNECTORS INDUSTRY

PLANT STATISTICS BY INDUSTRY AND PRIMARY PRODUCT CLASS SPECIALIZATION

COAXIAL (RF) CONNECTORS

	Number of Establishments	Number of Employees (Thous.)	Payroll ($ Mill.)	Payroll Per Employee (Dollars)	Production Workers: Number (Thous.)	Production Workers: Wages ($ Mill.)	Value of Shipments ($ Mill.)	Shipment Per Employee (Dollars)
Entire Industry	17	4.5	$71.9	$15,977	3.4	$47.0	$228.8	$50,844
Establishments with 75% Specialization or More	13	2.8	46.2	16,500	2.2	32.3	153.4	54,785

	Value Added ($ Mill.)	Value Added Per Employee (Dollars)	Cost of Materials ($ Mill.)	Payroll & Materials As % Sales	New Capital Expenditures ($ Millions)	Capital Expenditures as A % Value Added
Entire Industry	$148.1	$32,911	$81.5	67.0%	$15.1	10.2%
Establishments with 75% Specialization or More	110.1	39,321	46.0	60.1	10.5	9.5

SOURCE: CENSUS OF MANUFACTURES, MARKETDATA CALCULATIONS

CONNECTOR DISTRIBUTION CHANNEL ANALYSIS

Broad-line electronic components distribution firms remains a major sales channel for United States connector producers. Several forces are at work to shape the short and long-term strategies of these distributors regarding their stocking and sale of connectors.

A major development has been the withdrawal of Wyle from the connector business in December of 1985. Wyle blamed fierce competition that eroded profit margins as one factor. Also, management felt that electromechanical products such as connectors would continue to be displaced by integrated circuits, and chose instead to concentrate on semiconductors. As recently as 1983, Wyle carried connectors made by ITT Cannon, Amphenol, Ansley, Augat and Texas Instruments.

Also cited as a reason for the withdrawal was a perception that the distribtion industry is rapidly moving toward increased specialization. Wyle faced strong competition from connector "specialty houses", such as Time Electronics and Richey/Western.

However, not all distributors share Wyle's opinions. The majority of them still believe that connectors are a more stable market, that are still viable as components. Connectors are subject to competition from IC's, but they are evolving in different technologies - not being totally replaced by semiconductors. Connectors comprise 20-25% of the total United States components market, and are not likely to disappear any time soon. Consequently, many other distributors were puzzled by Wyle's withdrawal from the business.

Connectors remain a major product line for Arrow Electronics. Arrow management stated that "customers like to buy connectors from the same place they purchase their semiconductors and other components". Personnel at Arrow also made the very valid point that connector growth is not as explosive as semiconductors, but then again the connector market didn't drop 50% in sales during 1985 either.

Hall-Mark expects real dollar growth, but more importantly, the firm predicts that a larger share of sales will go through distributors. Milgray also remains committed to the connector market, seeing it as a solid business with good profit margins and good volume. As evidence of that commitment, Milgray entered into the military connector market via a franchise with Deutsch.

Distributors are also stepping up their involvement in assembly work, related to flat cable and insulation-displacement connectors. They are grabbing a larger share of the complete cable assembly business despite relatively high investment required (estimated at least $50-100,000 in capital equipment, not including personnel or facilities). Several connector manufacturers such as Molex, AMP, 3M, and DuPont's Connector Division (formerly Berg) also produce assembly equipment, and offer it to distributors for purchase or lease.

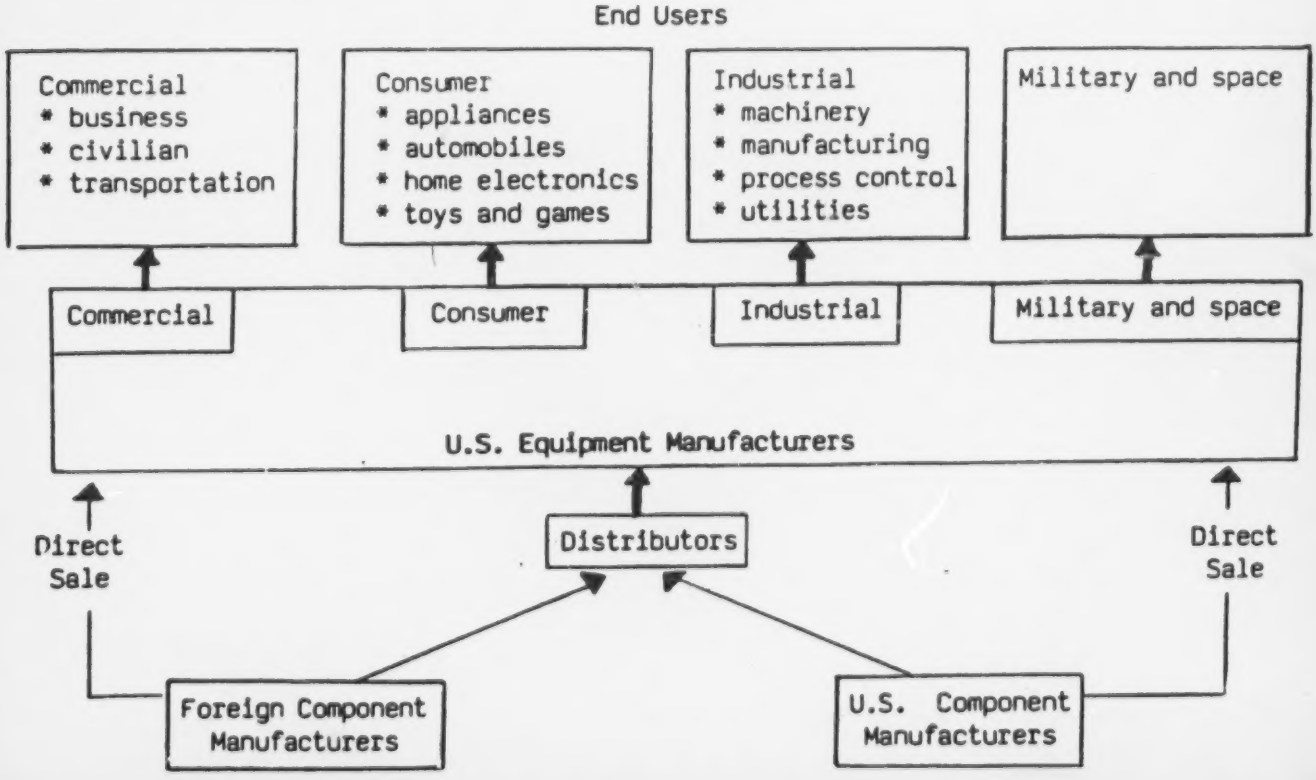
The rationale behind this investment by distributors is the fact that it generally costs more for original equipment manufacturers (OEMs) to purchase the cable and connectors, and then assemble them. Distributors that concentrated solely on the computer OEM's are hurting with the current slump. But, those who have gained access to telecommunications markets, CAD/CAM, military, instrumentation, and medical markets have fared better.

Two years ago it was estimated that assemblies accounted for 30-35% of the flat cable and connector market. Today, this may be as high as 50% for some distributors. Most distributors were predicting 20% growth in flat cable assemblies by year-end 1985.

OEMs are increasingly moving to contract manufacturing and the "just-in-time" delivery concept so popular in Japan. The distributor, as contract manufacturer, can build the product for less cost than the OEM because their "burden rate" is lower. They don't incur high engineering costs.

As the personal computer market softened, demand for flat cable assemblies shifted rapidly to the telecommunications market. These flat cable devices are expected to be the fastest growing segment. Bell Industires expects a 20% gain in its flat cable assembly business, versus marginal growth for the industry as a whole in 1986.

THE PURCHASING PICTURE



According to a 1980 industry study by Cahners Publishing's Manufacturing Industries Group: "Dynamics of the Electronics Marketplace--How Industry Buys & How Buyers Obtain Information":

39% of electronic components purchasers used DISTRIBUTORS as an information source for NEW PRODUCTS.
33% used them for TECHNICAL HELP.
35% used them for information regarding NEW SOURCES OF SUPPLY.
39% used them to evaluate SUPPLIER CAPABILITY.

Other vehicles such as: electronics publications (industry magazines, trade journals), general business publications, radio, TV, directories, catalogs, trade shows and company salesmen provide information as well. Each of these, with the exception of TV and radio, are major information sources consulted by buyers, depending on the type information needed.

By job function, corporate and operating management personnel have the greatest influence in authorizing/approving the purchase. Design and engineering personnel are the key people to specify/set performance goals. Selection of a particular brand and supplier rests with primarily design and engineering and purchasing management personnel. The suggestion or determination of the need for a component arises from design and engineering and production/packaging/manufacturing functions.

TOP 25 DISTRIBUTORS-BASED ON ESTIMATED 1984 INDUSTRIAL DISTRIBUTION SALES

(Millions of Dollars)

Rank	Distributor	Parent	Est. 1984 Sales
1.	Avnet Electronics Marketing Group	Avnet, Inc.	1,252.9
2.	Arrow Electronics	(Publically owned)	668.2
3.	Lex/Schweber	Lex Service plc	515.0
4.	Ducommun/Kierulff	Ducommun, Inc.	412.0
5.	Hall-Mark Electronics	Tyler Corp.	350.0
6.	Pioneer-Standard Electronics	(Publically owned)	322.0
7.	Marshall Industries	(Publically owned)	304.0
8.	Wyle Laboratories Electronics Marketing Group	Wyle Laboratories	282.0
9.	Premier Industrial Corp.	(Publically owned)	199.0
10.	Future Electronics, Inc.	(Privately held)	198.0
11.	Bell Industries	(Publically owned)	154.8
12.	Anthem Electronics	(Publically owned)	125.0
13.	DKM Electronics	(Privately held)	112.0
14.	Diplomat Electronics	(Publically owned)	110.0
15.	Milgray Electronics	(Publically owned)	83.0
16.	Powell Electronics	(Privately held)	71.0
17.	Zeus Components	(Publically owned)	70.0
18.	Lionex	(Privately held)	53.0
19.	Western Microtechnology	(Publically owned)	50.0
20.	R. V. Weatherford	(Publically owned)	48.0
21.	Sterling Electronics	(Publically owned)	46.0
22.	Integrated Electronics	(Privately held)	45.0
23.	Deanco	(Privately held)	42.0
24.	TTI	(Privately held)	40.0
25.	Cetec Electronics	Cetec Corp.	39.0

SOURCE: Estimated by Electronic News

COMPUTER ABSTRACTS OF CONNECTOR SALES FORECASTS, BY TYPE CONNECTOR AND END-USE CONSUMER

With current computer and database technologies, a wide variety of information about a particular product, market, technology or industry can be collected rapidly. Marketdata has used the Dialog/Lockheed database of business information to search and collect such information, in the form of computer, bibliographic "abstracts" covering the United States electronic connector market. The Predicast database of United States forecasts for SIC code 3678 was searched, via a local university library, for a period of one year's published materials from March 1985 - March 1986.

The information that follows in this section is derived mainly from electronics industry trade journals, the United States Department of Commerce, and industry analysts and other market research firms. The first several pages present a summary of this abstracted information, covering forecasts of various connector product lines and OEM/end-user consumption patterns. Frequently, trade journal estimates of market size will differ from United States Department of Commerce sales statistics because of different survey methods. One set of statistics may represent the total market value, including distributor mark-ups added before delivery to the final customer, while another set of numbers represents sales at the manufacturing level only.

RANKING OF THE TOP CONNECTOR PRODUCT LINES CONSUMED BY OEMS

1985

Type Connector	Dollar Value ($ Millions)	Percent of Total OEM Market
1. Cylindrical high density	$274	13.3%
2. PC, 1-piece	272	13.2
3. PC, 2-piece	238	11.5
4. Rack and Panel	181	8.8
5. Flat and ribbon cable	163	7.9
6. Dual-in-line socket	141	6.8
7. RF (coaxial)	127	6.2
8. Backpanel PC	123	6.0
9. Cylindrical standard	120	5.8
10. Packaging panel	81	3.9
11. Terminal block	79	3.8
12. Backpanel metal plate	47	2.3

Cumulative Total: 89.5

SOURCE: Calculated by Marketdata From Electronic Business Magazine Forecasts

FORECASTS OF CONNECTOR SALES (BY TYPE) TO OEM MARKETS

1985

Sales to Manufacturers of:
($ Millions)

Type Connector	Industrial Equipment	Commercial Equipment	Consumer Equipment	Military and Space Equipment	Total, All OEMS
Total, All Kinds	$521	$611	$55	$875	$2,062
Terminal Block	43	10	2	24	79
Rack and Panel	46	106	5	24	181
PC, 2-piece	27	44	-	167	238
PC, 1-piece	84	164	16	8	272
Packaging Panel	30	19	-	32	81
Flat and ribbon cable	40	70	7	46	163
Dual-in-line socket	44	63	10	24	141
Cylindrical standard	12	16	-	92	120
Cylindrical high density	30	12	-	232	274
RF (coaxial)	43	10	8	66	127
Backpanel PC	53	50	-	20	123
Backpanel metal plate	-	-	-	47	47

SOURCE: Electronic Business Magazine

FORECASTED PRODUCT LINE MIX - PERCENT DISTRIBUTION OF CONNECTOR SALES, BY TYPE, TO OEM SECTORS

1985

Type Connector	Percent of Total Sales to Manufacturers of: Industrial Equipment	Commercial Equipment	Consumer Equipment	Military and Space Equipment
Terminal Block	8.3%	1.6%	3.6%	2.7%
Rack & Panel	8.8	17.3	9.1	2.7
PC, 2-piece	5.2	7.2	-	19.1
PC, 1-piece	16.1	26.8	29.1	0.9
Packaging Panel	5.8	3.1	-	3.7
Flat and ribbon cable	7.7	11.5	12.7	5.2
Dual-in-line socket	8.4	10.3	18.2	2.7
Cylindrical standard	2.3	2.6	-	10.5
Cylindrical high density	5.8	2.0	-	26.5
RF (coaxial)	8.2	1.6	14.5	7.5
Backpanel PC	10.2	8.2	-	2.3
BAckpanel, metal plate	-	-	-	5.4
Total Dollar Value: (Millions)	$521	$611	$55	$875

Note: Percentages will not add exactly to 100%, since above product lines do not constitute all types of connectors.

SOURCE: Electronic Business Magazine
Marketdata Calculations

ELECTRONICS MAGAZINE FORECAST OF THE CONNECTOR MARKET, BY PRODUCT LINE

1984-1986
($ Millions)

Type Connector	1984		1985		1986	
	Sales	% of Total	Sales	% of Total	Sales	% of Total
Total, All Types	$3,392	100.0	$3,665	100.0	$4,120	100.0
PC, edge	693	20.4	892	24.3	981	23.8
Rack & Panel	707	20.8	696	19.0	801	19.4
Cylindrical, Total	570	16.8	556	15.2	597	14.5
- Miniature	207	6.1	201	5.5	224	5.4
- Standard	198	5.8	193	5.3	205	5.0
- Subminiature	165	4.9	162	4.4	168	4.1
Special purpose	533	15.7	495	13.5	536	13.0
Coaxial (excl. assemblies)	289	8.5	341	9.3	434	10.5
Flat Cable	281	8.3	328	8.9	359	8.7
Insulation displacement	254	7.5	277	7.6	312	7.6
Fiber-Optic	65	1.9	80	2.2	100	2.4

SOURCE: Electronics Magazine, Percent Calculations by Marketdata

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

1107241 Elec Busns 85/07/15 P20 United States
Electronic connectors. whsle price. .

YEAR	index
1983	100.
1984	103.
1985	105.10

GROWTH RATE= 2.0%+
CC=1USA PC=3678000 EC=744

1105157 Elec Busns 85/06/01 P79 United States
Electronic connectors. sales by. distributors.

YEAR	MIL $
1984	1150.
1985	1200.

GROWTH RATE= 4.3%
Hambrecht & Quist
CC=1USA PC=3678000 EC=694

1101052 Am Mtl Mkt 85/05/06 P34 United States
Electronic connectors. consump of. copper alloy contact material.

YEAR	MIL lbs
1985	100.
1995	200.

GROWTH RATE= 7.2%
Fleck Group
CC=1USA PC=3678000,3351435 EC=465

1101051 Am Mtl Mkt 85/05/06 P34 United States
Electronic connectors. consump of. copper alloy strip.

YEAR	MIL lbs
1985	80.

Fleck Group
CC=1USA PC=3678000,3351435 EC=465

1101050 Am Mtl Mkt 85/05/06 P34 United States
Electronic connectors. consump of. brass.

YEAR	index
1985	100.
1995	90.0

GROWTH RATE= -1.0%
Fleck Group
CC=1USA PC=3678000,3351030 EC=465

1101049 Am Mtl Mkt 85/05/06 P34 United States
Electronic connectors. sales. .

YEAR	BIL $
1984	6.4
1995	10.

GROWTH RATE= 4.1%
Fleck Group
CC=1USA PC=3678000 EC=652

1098327 Elec Busns 85/04/15 P18 United States
Electronic connectors. whsle price. .

YEAR	83 index
1984	102.90
1985	107.30
1986	113.50

GROWTH RATE= 5.0%
CC=1USA PC=3678000 EC=744

1098269 Elec Busns 85/04/15 P92 United States
Electronic connectors. dom shipment. .

YEAR	BIL $
1983	4.0
1984	4.8
1985	5.3

GROWTH RATE= 10.4%+
Fleck, K pres,Fleck Group
CC=1USA PC=3678000 EC=632

1098268 Elec Busns 85/04/15 P92 United States
Electronic connectors. production. .

YEAR	MIL $

(cont. next page)

DIALOG

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

1983 3270.
1984 3830.
1985 4240.

GROWTH RATE= 10.7%*
Gnostic Concepts
CC=1USA PC=3678000 EC=622

1098267 Elec Busns 85/04/15 P101 United States
Surface mounted connectors. sales. .

YEAR MIL $

1984 4.7
1988 106.

GROWTH RATE= 117.9%
Zapin, P analyst,Technomics Consultants
CC=1USA PC=3678049 EC=652

1098266 Elec Busns 85/04/15 P104 United States
Printed circuit connectors. consumption. .

YEAR growth/yr

1985 -
TO +10.%
1987 -

GROWTH RATE= 10.0%
Benn Publications
CC=1USA PC=3678040 EC=656

1097680 ElectrncWk 85/02/25 P58 United States
Electronic connectors. consumption. as % of all govt component consump.

YEAR % of total

1983 28.
1988 24.

GROWTH RATE= -3.0%
Spence, MT mgr,Gnostic Concepts
CC=1USA PC=3678000 EC=656

1097660 ElectrncWk 85/02/25 P56 United States
Electronic connectors. productn for. defense electronics equip.

YEAR MIL $

1984 921.4
1985 1063.
1988 1568.

GROWTH RATE= 14.2%
Spence, MT mgr,Gnostic Concepts
CC=1USA PC=3678000 EC=623

1087079 US Outlook 85/01/00 P32-7 United States
Electronic connectors. exports. .

YEAR MIL $

1983 294.9
1984 380.1
1985 422.2

GROWTH RATE= 11.1%*
CC=1USA PC=3678000 EC=644

1087078 US Outlook 85/01/00 P32-7 United States
Electronic connectors. imports. .

YEAR MIL $

1983 207.3
1984 260.
1985 299.

GROWTH RATE= 15.0%*
CC=1USA PC=3678000 EC=643

1087077 US Outlook 85/01/00 P32-7 United States
Electronic connectors. shipments. .

YEAR MIL 72$

1983 1376.
1984 1531.
1985 1623.

GROWTH RATE= 6.0%*
CC=1USA PC=3678000 EC=631

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

1087076 US Outlook 85/01/00 P32-7 United States
Electronic connectors industry. employ of. production workers.

YEAR	000 worker
1983	28.4
1984	29.7
1985	30.4

GROWTH RATE= 2.4%*
CC=1USA PC=3678000 EC=535

1087075 US Outlook 85/01/00 P32-7 United States
Electronic connectors industry. employment. .

YEAR	000 worker
1983	40.3
1984	42.1
1985	43.

GROWTH RATE= 2.1%*
CC=1USA PC=3678000 EC=531

1087074 US Outlook 85/01/00 P32-7 United States
Electronic connectors industry. shipments. .

YEAR	MIL 72$
1983	1478.
1984	1654.
1985	1751.

GROWTH RATE= 5.9%*
CC=1USA PC=3678000 EC=631

1086834 US Outlook 85/01/00 P32-3 United States
Electronic connectors. shipments. (constant prices).

YEAR	growth/yr
1985 TO 1989	+8.%

GROWTH RATE= 8.0%
CC=1USA PC=3678000 EC=631

1084493 Elec Week 85/01/09 P13 United States
Computer industry. consump of. electronic connectors.

YEAR	MIL 83$
1983	650.0
1988	2124.0

GROWTH RATE= 26.7%
Frost & Sullivan
CC=1USA PC=3573000,3678000 EC=437

1080188 Elec Busns 85/01/01 P184 United States
Electronic connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	707.
1984	808.
1985	875.

GROWTH RATE= 8.3%*
CC=1USA PC=3678000 EC=664

1080187 Elec Busns 85/01/01 P184 United States
Terminal block connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	20.
1984	22.
1985	24.

GROWTH RATE= 9.1%*
CC=1USA PC=3678090 EC=664

1080186 Elec Busns 85/01/01 P184 United States
Rack & panel connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	20.
1984	22.
1985	24.

GROWTH RATE= 9.1%*

(cont. next page)

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

CC=1USA PC=3678030 EC=664
1080185 Elec Busns 85/01/01 P184 United States
PC,two piece connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	133.
1984	150.
1985	167.

GROWTH RATE= 11.3%*
CC=1USA PC=3678040 EC=664

1080184 Elec Busns 85/01/01 P184 United States
PC,one piece connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	7.
1984	8.
1985	8.

GROWTH RATE= 0.0%*
CC=1USA PC=3678040 EC=664

1080183 Elec Busns 85/01/01 P184 United States
Packaging panel connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	26.
1984	30.
1985	32.

GROWTH RATE= 6.7%*
CC=1USA PC=3678070 EC=664

1080182 Elec Busns 85/01/01 P184 United States
Flat & ribbon cable connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	35.
1984	41.
1985	46.

GROWTH RATE= 12.2%*
CC=1USA PC=3678048 EC=664

1080180 Elec Busns 85/01/01 P184 United States
Dual in line socket connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	17.
1984	21.
1985	24.

GROWTH RATE= 14.3%*
CC=1USA PC=3678045 EC=664

1080179 Elec Busns 85/01/01 P184 United States
Cylindrical standard connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	69.
1984	85.
1985	92.

GROWTH RATE= 8.2%*
CC=1USA PC=3678021 EC=664

1080178 Elec Busns 85/01/01 P184 United States
Cylindrical high density connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	189.
1984	215.
1985	232.

GROWTH RATE= 7.9%*
CC=1USA PC=3678022 EC=664

1080177 Elec Busns 85/01/01 P184 United States
RF (coaxial) connectors. sales to. military & space equip mfrs.

YEAR MIL $

(cont. next page)

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

1983	49.
1984	59.
1985	66.

GROWTH RATE= 11.9%*
CC=1USA PC=3678010 EC=664

1080176 Elec Busns 85/01/01 P184 United States
Backpanel printed crct connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	12.
1984	15.
1985	20.

GROWTH RATE= 33.3%*
CC=1USA PC=3678070 EC=664

1080175 Elec Busns 85/01/01 P184 United States
Backpanel metal plate connectors. sales to. military & space equip mfrs.

YEAR	MIL $
1983	49.
1984	52.
1985	47.

GROWTH RATE= -9.6%*
CC=1USA PC=3678070 EC=664

1080174 Elec Busns 85/01/01 P184 United States
Electronic connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	436.
1984	474.
1985	521.

GROWTH RATE= 9.9%*
CC=1USA PC=3678000 EC=664

1080173 Elec Busns 85/01/01 P184 United States
Terminal block connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	37.
1984	40.
1985	43.

GROWTH RATE= 7.5%*
CC=1USA PC=3678090 EC=664

1080172 Elec Busns 85/01/01 P184 United States
Rack & panel connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	37.
1984	41.
1985	46.

GROWTH RATE= 12.2%*
CC=1USA PC=3678030 EC=664

1080171 Elec Busns 85/01/01 P184 United States
PC,two piece connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	19.
1984	23.
1985	27.

GROWTH RATE= 17.4%*
CC=1USA PC=3678040 EC=664

1080170 Elec Busns 85/01/01 P184 United States
PC,one piece connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	71.
1984	79.
1985	84.

GROWTH RATE= 6.3%*
CC=1USA PC=3678040 EC=664

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

1080169 Elec Busns 85/01/01 P184 United States
Packaging panel connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	29.
1984	30.
1985	30.

GROWTH RATE= 0.0%*
CC=1USA PC=3678070 EC=664

1080168 Elec Busns 85/01/01 P184 United States
Flat & ribbon cable connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	33.
1984	35.
1985	40.

GROWTH RATE= 14.3%*
CC=1USA PC=3678048 EC=664

1080166 Elec Busns 85/01/01 P184 United States
Dual in line socket connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	33.
1984	37.
1985	44.

GROWTH RATE= 18.9%*
CC=1USA PC=3678045 EC=664

1080165 Elec Busns 85/01/01 P184 United States
Cylindrical standard connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	10.
1984	10.
1985	12.

GROWTH RATE= 20.0%*
CC=1USA PC=3678021 EC=664

1080164 Elec Busns 85/01/01 P184 United States
Cylindrical high density connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	26.
1984	28.
1985	30.

GROWTH RATE= 7.1%*
CC=1USA PC=3678022 EC=664

1080163 Elec Busns 85/01/01 P184 United States
RF (coaxial) connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	38.
1984	41.
1985	43.

GROWTH RATE= 4.9%*
CC=1USA PC=3678010 EC=664

1080162 Elec Busns 85/01/01 P184 United States
Backpanel printed crct connectors. sales to. industrial equipment mfrs.

YEAR	MIL $
1983	42.
1984	45.
1985	53.

GROWTH RATE= 17.8%*
CC=1USA PC=3678070 EC=664

1080161 Elec Busns 85/01/01 P184 United States
Electronic connectors. sales to. consumer equipment mfrs.

YEAR	MIL $
1983	42.
1984	52.
1985	55.

(cont. next page)

DIALOG INFORMATION SERVICES, INC.

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

GROWTH RATE= 5.8%*
CC=1USA PC=3678000 EC=664

1080160 Elec Busns 85/01/01 P184 United States
Terminal block connectors. sales to. consumer equipment mfrs.

YEAR	MIL $
1983	3.
1984	2.
1985	2.

GROWTH RATE= 0.0%*
CC=1USA PC=3678090 EC=664

1080159 Elec Busns 85/01/01 P184 United States
Rack & panel connectors. sales to. consumer equipment mfrs.

YEAR	MIL $
1983	4.
1984	5.
1985	5.

GROWTH RATE= 0.0%*
CC=1USA PC=3678030 EC=664

1080158 Elec Busns 85/01/01 P184 United States
PC,one piece connectors. sales to. consumer equipment mfrs.

YEAR	MIL $
1983	13.
1984	15.
1985	16.

GROWTH RATE= 6.7%*
CC=1USA PC=3678040 EC=664

1080157 Elec Busns 85/01/01 P184 United States
Flat & ribbon cable connectors. sales to. consumer equipment mfrs.

YEAR	MIL $
1983	4.
1984	6.
1985	7.

GROWTH RATE= 16.7%*
CC=1USA PC=3678048 EC=664

1080155 Elec Busns 85/01/01 P184 United States
Dual in line socket connectors. sales to. consumer equipment mfrs.

YEAR	MIL $
1983	7.
1984	9.
1985	10.

GROWTH RATE= 11.1%*
CC=1USA PC=3678045 EC=664

1080154 Elec Busns 85/01/01 P184 United States
RF (coaxial) connectors. sales to. consumer equipment mfrs.

YEAR	MIL $
1983	7.
1984	8.
1985	8.

GROWTH RATE= 0.0%*
CC=1USA PC=3678010 EC=664

1080153 Elec Busns 85/01/01 P184 United States
Electronic connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	491.
1984	559.
1985	611.

GROWTH RATE= 9.3%*
CC=1USA PC=3678000 EC=664

1080152 Elec Busns 85/01/01 P184 United States
Terminal block connectors. sales to. commercial equipment mfrs.

YEAR MIL $

(cont. next page)

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

1983	9.
1984	10.
1985	10.

GROWTH RATE= 0.0%*
CC=1USA PC=3678090 EC=664

1080151 Elec Busns 85/01/01 P184 United States
Rack & panel connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	85.
1984	93.
1985	106.

GROWTH RATE= 14.0%*
CC=1USA PC=3678030 EC=664

1080150 Elec Busns 85/01/01 P184 United States
PC,two piece connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	31.
1984	36.
1985	44.

GROWTH RATE= 22.2%*
CC=1USA PC=3678040 EC=664

1080149 Elec Busns 85/01/01 P184 United States
PC,one piece connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	129.
1984	150.
1985	164.

GROWTH RATE= 9.3%*
CC=1USA PC=3678040 EC=664

1080148 Elec Busns 85/01/01 P184 United States
Packaging panel connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	18.
1984	20.
1985	19.

GROWTH RATE= -5.0%*
CC=1USA PC=3678070 EC=664

1080147 Elec Busns 85/01/01 P184 United States
Flat & ribbon cable connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	56.
1984	64.
1985	70.

GROWTH RATE= 9.4%*
CC=1USA PC=3678048 EC=664

1080145 Elec Busns 85/01/01 P184 United States
Dual in line socket connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	47.
1984	57.
1985	63.

GROWTH RATE= 10.5%*
CC=1USA PC=3678045 EC=664

1080144 Elec Busns 85/01/01 P184 United States
Cylindrical standard connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	13.
1984	15.
1985	16.

(cont. next page)

DIALOG File 81: PTS US Forecasts - 71-85/Sep (Copr. Predicasts Inc. 1986)

GROWTH RATE= 6.7%*
CC=1USA PC=3678021 EC=664

1080143 Elec Busns 85/01/01 P184 United States
Cylindrical high density connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	10.
1984	11.
1985	12.

GROWTH RATE= 9.1%*
CC=1USA PC=3678022 EC=664

1080142 Elec Busns 85/01/01 P184 United States
RF (coaxial) connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	8.
1984	9.
1985	10.

GROWTH RATE= 11.1%*
CC=1USA PC=3678010 EC=664

1080141 Elec Busns 85/01/01 P184 United States
Backpanel printed crct connectors. sales to. commercial equipment mfrs.

YEAR	MIL $
1983	44.
1984	48.
1985	50.

GROWTH RATE= 4.2%*
CC=1USA PC=3678070 EC=664

1080140 #Elec Busns 85/01/01 P184 United States
Electronic connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	1676.
1984	1893.
1985	2062.

GROWTH RATE= 8.9%*
CC=1USA PC=3678000 EC=664

1080139 #Elec Busns 85/01/01 P184 United States
Terminal block connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	69.
1984	74.
1985	79.

GROWTH RATE= 6.8%*
CC=1USA PC=3678090 EC=664

1080138 #Elec Busns 85/01/01 P184 United States
Rack & panel connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	146.
1984	161.
1985	181.

GROWTH RATE= 12.4%*
CC=1USA PC=3678030 EC=664

1080137 #Elec Busns 85/01/01 P184 United States
PC,two piece connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	183.
1984	210.
1985	239.

GROWTH RATE= 13.8%*
CC=1USA PC=3678040 EC=664

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1080136 #Elec Busns 85/01/01 P184 United States
PC,one piece connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	220.
1984	252.
1985	272.

GROWTH RATE= 7.9%*
CC=1USA PC=3678040 EC=664

1080135 #Elec Busns 85/01/01 P184 United States
Packaging panel connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	73.
1984	80.
1985	81.

GROWTH RATE= 1.2%*
CC=1USA PC=3678070 EC=664

1080134 #Elec Busns 85/01/01 P184 United States
Flat & ribbon cable connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	128.
1984	146.
1985	163.

GROWTH RATE= 11.6%*
CC=1USA PC=3678048 EC=664

1080132 #Elec Busns 85/01/01 P184 United States
Dual in line socket connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	104.
1984	124.
1985	141.

GROWTH RATE= 13.7%*
CC=1USA PC=3678045 EC=664

1080131 #Elec Busns 85/01/01 P184 United States
Cylindrical standard connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	92.
1984	110.
1985	120.

GROWTH RATE= 9.1%*
CC=1USA PC=3678021 EC=664

1080130 #Elec Busns 85/01/01 P184 United States
Cylindrical high density connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	225.
1984	254.
1985	274.

GROWTH RATE= 7.9%*
CC=1USA PC=3678022 EC=664

1080129 #Elec Busns 85/01/01 P184 United States
RF (coaxial) connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	102.
1984	117.
1985	127.

GROWTH RATE= 8.5%*
CC=1USA PC=3678010 EC=664

1080128 #Elec Busns 85/01/01 P184 United States
Backpanel printed crct connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	98.
1984	108.
1985	123.

(cont. next page)

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GROWTH RATE= 13.9%*
CC=1USA PC=3678070 EC=664

1080127 #Elec Busns 85/01/01 P184 United States
Backpanel metal plate connectors. sales to. original eqp mfrs by sector.

YEAR	MIL $
1983	51.
1984	53.
1985	47.

GROWTH RATE= -11.3%*
CC=1USA PC=3678070 EC=664

DIALOG

RF, COAXIAL & TRIAXIAL CONNECTOR SUPPLIERS

*ADC Magnetic Controls Co.,
4900 W. 78th St., Minneapolis, MN 55435; 612-835-6800
*AMP Incorporated,
Box 3608, Harrisburg, PA 17105; 717-564-0100
*AMP Products Corp.,
PO Box 1776, Paoli, PA 19301; 215-647-1000
*Adams-Russell, Anzac Division,
80 Cambridge St., Burlington, MA 01803; 617-273-3333
Air Electro Supply, Inc.,
7700 Gloria Ave., Van Nuys, CA 91406; 213-873-6400 818-988-4400
AirBorn, Inc.,
4321 AirBorn Dr., Addison, TX 75001; 214-931-3200
Alden Products Co.,
PO Box 860, 117 N. Main St., Brockton, MA 02403; 617-583-0160
*Alpha Products, Inc.,
5740 Corsa Ave. 04, Westlake Village, CA 91362; 818-889-9304
American Electronic Labs,
Box 552, Lansdale, PA 19446; 215-822-2929
Andrew Corp.,
10500 W. 153rd St., Orland Park, IL 60462; 312-349-3300
*Applied Engineering Products,
PO Box A-D, Amity Station, New Haven, CT 06525; 203-387-5282
*Arco Electronics,
400 Moreland Rd., Commack, NY 11725; 516-864-7000
*Armel Electronics,
1601 75th St., N. Bergen, NJ 07047; 201-869-4201
*Associated Engineering Mfg.,
546 Valley Road, Upper Montclair, NJ 07043; 201-783-7800
*Astrolab,
345 Dalziel Rd., Linden, NJ 07036; 201-862-0222
*Automatic Connector, Inc.,
400 Moreland Rd., Commack, NY 11725; 516-543-5000
*Bendix Corp., Electrical Components Div.,
Sidney, NY 13838; 607-563-5324
*Bird Electronics,
30303 Aurora Rd., Cleveland, OH 44139; 216-248-1200
Buggie H.H./Canton Connector Corp.,
20 Wopping Rd., Kingston, MA 02364; 717-585-4315
Burndy Corporation,
Richards Ave., Norwalk, CT 06852; 203-838-4444
Cablewave Systems,
60 Dodge Ave., North Haven, CT 06473; 203-239-3311
Cambridge Products, Hi-G, Inc,
244 Woodland Ave., Bloomfield, CT 06002; 203-243-1761
Ceramaseal,
Box 25, New Lebanon Center, NY 12126; 518-794-7800
Compac,
279 Skidmore Rd., Deer Park, NY 11729; 516-667-3933
Computer Cable & Products, Inc., Affil. Vertex Electronics,
147 Gazza Blvd., Farmingdale, NY 11735; 516-293-1610
Concord Electronics,
30 Great Jones Street, Dept. JE, New York, NY 10012; 212-777-6571
Connector Corp.,
6025 N. Keystone Ave., Chicago, IL 60646; 312-539-3108

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*Product meets MIL Specs
Source: 1984/85 Electronic Engineering Master Directory

*Connector Industries of America,
639 N. Wayne, Cincinnati, OH 45215; 513-733-3680
Dai-Ichi Shoji of America, Inc.,
150 Fifth Avenue, New York, NY 10011; 212-691-9050
*Dataware Systems Lease, Inc.,
30 Bay Street, Staten Island, NY 10301; 212-447-4911
*E-Z-Hook, Div. Tektest Inc.,
Box 450, 225 N. Second Ave., Arcadia, CA 91006; 818-446-6175
E. F. Johnson Co.,
299 Johnson Ave., Waseca, MN 56093; 507-835-6222
*EMC Technology Inc.,
1971 Old Cuthbert Rd., Cherry Hill, NJ 08034; 609-429-7800
Fischer-America, Inc.,
13756 Glenoaks Blvd., Sylmar, CA 91342; 818-362-9393
*Frequency Electronics,
55 Charles Lindbergh Blvd., Mitchell Field, NY 11553; 516-794-4500
GC Electronics,
400 S. Wyman St., Rockford , IL 61101; 815-968-9661
Gabriel Electronics,
Box 70, Scarborough Industrial Park, Scarborough, ME 04074; 207-883-5161
Goldwell Comps.,
1815 W. 205th St., Suite 201, Torrance, CA 90501; 213-533-1228
Gra-Mar Inc.,
3165 McCrory Place, Suite 265, Orlando, FL 32803; 305-894-3351
Hypertronics Corp.,
16 Brent Dr., Hudson, MA 01749; 617-568-0451 800-225-9228
ITT Cannon,
10550 Talbert Ave., PO Box 8040, Fountain Valley, CA 92708; 714-964-7400
ITT Pomona Electronics,
1500 E. 9th Street, PO Box 2767, Pomona, CA 91766; 714-623-3463
Kevlin Microwave Corp.,
26 Conn St., Woburn, MA 01801; 617-935-4800
*Kings Electronics,
40 Marbledale Rd., Tuckahoe, NY 10707; 914-793-5000
Kulka Smith, Inc.,
1913 Atlantic Ave., Manasquan, NJ 08736; 201-223-9400
L-Com Inc.,
1755 Osgood St., Unit 11EM, N. Andover, MA 01845; 617-682-6936
Lemo U.S.A. Inc.,
PO Box 11006M, Santa Rosa, CA 95406; 707-578-8811
*M/A-COM Omni Spectra, Inc.,
21 Continental Blvd., Merrimack, NH 03054; 603-424-4111
M/A-Com, Inc.,
PO Box 468, Newton, NC 28658; 704-464-4141 800-222-1195
Macom Industries,
8230 Haskell Ave., Van Nuys, CA 91406; 800-222-1195
Malco, Div. Microdot Connector Grp.,
12 Progress Dr., Montgomeryville, PA 18936; 215-699-5373
Maury Microwave,
8610 Helms Ave., Cucamonga, CA 91730; 714-987-4715
*Micro Mode Products,
1870 John Towers Ave., El Cajon, CA 92020; 619-449-3844
*Microtech,
1420 Conchester Hwy., Boothwyn, PA 19061; 215-459-3566
Middleburg Corporation, Middco Connectors,
220 Albany Turnpike, Canton, CT 06019; 203-693-8361
Midland-Ross Corp., Cambion Division,
One Airwife Place, Cambridge, MA 02140; 617-491-5400
Mura Corporation,
177 Cantiague Rock Rd., Westbury, NY 11590; 516-935-3640
Murata Manufacturing Co., Ltd.,
26-10 2-chome-Temjin, Nagaoka-Kyo-Shi, Kyoto,, JAPAN; 075-921-9111

National Tel-Tronics,
State Road Hill, Meadville, PA 16335; 814-724-6440
Olympic Wire & Cable,
1 Madison Rd., Fairfield, NJ 07006; 201-227-7996
*Omni Spectra,
21 Continental Blvd., Merrimack, NH 03054; 603-424-4111
RMS Electronics Inc.,
50 Antin Pl., Bronx, NY 10462; 212-892-6700
Raychem Corporation, Electronics Group,
300 Constitution Dr., Menlo Park, CA 94025; 415-361-3860
*Rowe Industries, Inc.,
6225 Benore Rd., PO Box 6877, Toledo, OH 43612; 419-729-9761
Sabritec,
16631 Noyes Ave., Irvine, CA 92714; 714-549-7350
Sealectro,
225 Hoyt St., Mamaroneck, NY 10543; 914-698-5600
Security Plastics Inc.,
14427 N.W. 60th Ave., Miami Lakes, FL 33014; 305-823-5440
Shogyo International Corp.,
287 Northern Blvd., Great Neck, NY 11021; 516-466-0911
Sitco Antennas,
10330 N.E. Marx St., Portland, OR 97220; 503-253-2000
*Solitron-Microwave,
Box 278, Port Salerno, FL 33492; 305-287-5000
Storm Products Co.,
116 Shore Drive, Hinsdale, IL 60521; 312-323-9121
Support Systems International Corp.,
150 South Second St., Richmond, CA 94804; 415-234-9090
TRW Connector Div., TRW Electronic Components Grp.,
1501 Morse Ave., Elk Grove Village, IL 60007; 312-981-6000
*TRW Cylindrical Connector Div., TRW Electronic Components Grp.,
8821 Science Center Dr., Minneapolis, MN 55428; 612-537-1010
*Ted Corporation,
11415 Johnson Dr., Shawnee Mission, KS 66203; 913-631-6211
*Thomas & Betts, Electronics Group Headquarters,
920 Rte. 202, Raritan, NJ 08869; 201-469-4000
Thomson-CSF Corporation, Socapex Division,
6660 Variel Ave., Canoga Park, CA 91303; 213-887-0750
Times Fiber Communications, Inc.,
358 Hall Ave., Wallingford, CT 06492; 203-265-8500
Trimm, Inc., Div. of Newton Instr. Company,
400 W. Lake St., Box 489, Libertyville, IL 60048; 312-362-3700
*Trompeter Electronics, Inc.,
8936 Comanche, Chatsworth, CA 91311; 818-882-1020
Uniform Tubes,
Collegeville, PA 19426; 215-539-0700
Wall-Able Manufacturing Corp.,
1800 N. Clybourn Ave., Chicago, IL 60614; 312-440-1000
*Weinschel Engineering,
One Weinschel Lane, Gaithersburg, MD 20877; 301-948-3434 800-638-2048
Whittaker Corporation, Electronic Resources Div.,
100 E. Tujunga Avd., Burbank, CA 91502; 818-843-5770
Wiltron,
805 E. Middlefield Rd., PO Box 7290, Mountain View, CA 94042; 415-969-6500

3M-Electronic Products Division,
3M Center, Bldg. 225-1N-06, St. Paul, MN 55144; 612-733-7408
*AMP Incorporated,
Box 3608, Harrisburg, PA 17105; 717-564-0100
AMP Products Corp.,
PO Box 1776, Paoli, PA 19301; 215-647-1000
Air Electro Supply, Inc.,
7700 Gloria Ave., Van Nuys, CA 91406; 213-873-6400 818-988-4400
*AirBorn, Inc.,
4321 AirBorn Dr., Addison, TX 75001; 214-931-3200
Alden Products Company,
PO Box 860, 117 N. Main St., Brockton, MA 02403; 617-583-0160
Alpha Products, Inc.,
5740 Corsa Ave. 04, Westlake Village, CA 91362; 818-889-9304
American Zettler,
16881 Hale Ave., Irvine, CA 92714; 714-660-1670
Amlan, Inc.,
97 Thornwood Rd., Stamford, CT 06903; 203-322-1913
Appleton Electronics,
2205 12th Ave., So. Milwaukee, WI 53172; 414-764-7200
Auto-Swage Products,
726 River Rd., Shelton, CT 06484; 203-929-1401
Autosplice, Inc.,
59-12 37th Ave., Woodside, NY 11377; 212-429-0500
BICC-Vero Electronics, Inc.,
171 Bridge Rd., Hauppauge, NY 11788; 516-234-0400
*Bailey Controls Co.,
29801 Euclid Ave., Wickliffe, OH 44092; 216-585-5800
Beau Products Division,
Box 10, Laconia, NH 03247; 603-524-5101
Bendix Corp., Electrical Comps. Div.,
Sidney, NY 13838; 607-563-5324
Bud Industries, Inc.,
4605 E. 355th St., Willoughby, OH 44094; 216-946-3200
Buggie H.H./Canton Connector Corp.,
20 Wapping Rd., Kingston, MA 02364; 617-585-4315
Burndy Corporation,
Richards Ave., Norwalk, CT 06852; 203-838-4444
CTS Corp.,
905 North West Blvd., Elkart, IN 46514; 219-293-7511
*CTS Fabri-Tek, Inc., Connector Div.,
9210 Science Center Dr., Minneapolis, MN 55428; 612-533-3533
Canton Connector Corp.,
Jones River Industrial Park, 20 Wapping Rd., Kingston, MA 02364; 617-585-4315
Ceramaseal,
Box 25, New Lebanon Center, NY 12126; 518-794-7800
Concord Electronics,
30 Great Jones St., Dept. JE, New York, NY 10012; 212-777-6571
*Contact Electronics Inc.,
30 Plymouth St., Fairfield, NJ 07006; 201-575-7660 800-221-1451
*Dale Electronics, Inc., Yankton Division,
East Highway 50, Box 180, Yankton, SD 57078; 605-685-9301
*Dataware Systems Lease, Inc.,
30 Bay St., Staten Island, NY 10301; 212-447-4911
Deutsch Co., Deutsch Fiber Optics Div.,
7001 W. Imperial Hwy., Los Angeles, CA 90045; 213-649-1400
Douglas Electronics,
718 Marina Blvd., San Leandro, CA 94577; 415-483-8770
Edac Inc.,
20 Railside Rd., Toronto, ON M3A 1A4, CANADA, 416-445-2292

*Elco Corp., Electronic Connector Div.,
Huntingdon Industrial Park, Huntingdon, PA 16652; 814-643-0700
Fischer-America Inc.,
13756 Glenoaks Blvd., Sylmar, CA 91342; 818-362-9393
*Hermetic Seal,
4232 Temple City Blvd., Rosemead, CA 91770; 818-283-0411
*Hughes Aircraft Co., Connecting Devices Div.,
17150 Von Karman Ave., Irvine, CA 92714; 714-660-5701
*Hybricon Corp.,
410 Great Rd., Littleton, MA 01460; 617-486-3174
*Hypertronics Corp.,
16 Brent Dr., Hudson, MA 01749; 617-568-0451 800-225-9228
ITT Cannon,
10550 Talbert Ave., PO Box 8040, Fountain Valley, CA 92708; 714-964-7400
ITT Pomona Electronics,
1500 E. 9th St., PO Box 2767, Pomona, CA 91766; 714-623-3463
Ideal Industries,
4450 Becker Pl., Sycamore, IL 60178; 815-895-5181
Kulka Smith, Inc.,
1913 Atlantic Ave., Manasquan, NJ 08736; 201-223-9400
L-Com Inc.,
1755 Osgood St., Unit 11EM, N. Andover, MA 01845; 617-682-6936
Lemo U.S.A. Inc.,
PO Box 11006M, Santa Rosa, CA 95406; 707-578-8811
Malco, Div. Microdot Connector Grp.,
12 Progress Dr., Montgomeryville, PA 18936; 215-699-5373
Metuchen Capacitors, Inc.,
420 Park Ave., Perth Amboy, NJ 08861; 201-442-0500
*Middleburg Corp., Middco Connectors,
220 Albany Turnpike, Canton, CT 06019; 203-693-8361
*Milton Ross Co.,
511 Second St. Pike, Southampton, PA 18966; 215-355-0200
Min-E-Con,
17815 F Sky Park Blvd., Irvine, CA 92714; 714-250-0474
Neutrik Products,
77 Selleck St., Stamford, CT 06902; 203-348-2121
Robinson-Nugent, Inc.,
800 E. 8th St., New Albany, IN 47150; 812-945-0211
Rowe Industries, Inc.,
6225 Benore Rd., PO Box 6877, Toldeo, OH 43612; 419-729-9761
Sabritec,
16631 Noyes Ave., Irvine, CA 92714; 714-549-7350
Schroff Inc.,
170 Commerce Dr., Warwick, RI 02886; 401-732-3770
Schroff UK Ltd.,
Maylands Ave., Hemel Hempstead, Herts, HP2 4SG, ENGLAND, 0442-40471/6
Security Plastics Inc.,
14427 N.W. 60th Ave., Miami Lakes, FL 33014; 305-823-5440
*Shogyo International Corp.,
287 Northern Blvd., Great Neck, NY 11021; 516-466-0911
Souriau, Inc.,
25158 Avenue Stanford, Valencia, CA 91355; 805-257-4830
Spectrum Control, Inc.,
2185 W. 8th St., Erie, PA 16505; 814-455-0966
Stanford Applied Engineering Inc.,
3520 De La Cruz Blvd., Santa Clara, CA 95050; 408-980-1600
Support Systems International Corp.,
150 South Second St., Richmond, CA 94804; 415-234-9090
Switchcraft, Inc.,
5555 N. Elston, Chicago, IL 60630; 312-792-2700
Symbex Corp.,
72 Corwin Dr., Box 938, Painesville, OH 44077; 216-354-0925

*TRW Connector Div., TRW Electronic Components Grp.,
1501 Morse Ave., Elk Grove Village, IL 60007; 312-981-6000
TRW Cylindrical Connector Div., TRW Electronic Components Grp.,
8821 Science Center Dr., Minneapolis, MN 55428; 612-537-1010
Teka Products,
45 Salem, Providence, RI 02907; 401-785-4110
Texas Instruments, Matls. & Controls Group,
34 Forest St., Attleboro, MA 02703; 617-699-3800
Thomas & Betts, Electronics Group Headquarters,
920 Rte. 202, Raritan, NJ 08869; 201-469-4000
Thomson-CSF Comps. Corp., Socapex Division,
6660 Variel Ave., Canoga Park, CA 91303; 213-887-0750
Viking Connectors,
21001 Nordhoff St., PO Box 2379, Chatsworth, CA 91311; 818-341-4330
Weco Electrical Connectors Inc.,
PO Box 84, Ste. Anne De, Bellevue PQ H9X 3L4, CANADA, 514-457-3648
Wells Electronics,
1701 S. Main St., South Bend, IN 46613; 219-287-5941

PRINTED CIRCUIT CONNECTOR SUPPLIERS

3M-Electronic Products Division,
3M Center, Bldg. 225-1N-06, St. Paul, MN 55144; 612-733-7408
*AMP Incorporated,
Box 3608, Harrisburg, PA 17105; 717-564-0100
*AMP Products Corp.,
PO Box 1776, Paoli, PA 19301; 215-647-1000
Accessories for Electronics, Inc.,
800 Merrick Rd., Baldwin, NY 11510; 516-546-1751
Accurate Electronics,
169 S. Abbe Rd., PO Box 1287, Elyria, OH 44036; 216-365-1211
AirBorn, Inc.,
4321 AirBorn Dr., Addison, TX 75001; 214-931-3200
Alden Products Company,
PO Box 860, 117 N. Main St., Brockton, MA 02403; 617-583-0160
Alpha Products, Inc.,
5740 Corsa Ave. 04, Westlake Village, CA 91362; 818-889-9304
Alpha Wire Corp.,
711 Lidgerwood Ave., PO Box 711, Elizabeth, NJ 07207; 201-925-8000
Amlan, Inc.,
97 Thornwood Rd., Stamford, CT 06903; 203-322-1913
Aries Electronics,
Box 130, Frenchtown, NJ 08825; 201-996-6841
*Armel Electronics,
1601 75th St., N. Bergen, NJ 07047; 201-869-4201
*Art Wire/Doduco,
9 Wing Dr., Cedar Knolls, NJ 07927; 201-267-2000
*Associated Engineering Mfg.,
546 Valley Rd., Upper Montclair, NJ 07043; 201-783-7800
*Astrolab,
345 Daiziel Rd., Linden, NJ 07036; 201-862-0022
Augat Inc.,
33 Perry Ave., Box 779, Attleboro, MA 02703; 617-222-2202
Auto-Swage Products,
726 River Rd., Shelton, CT 06484; 203-929-1401
Autosplice, Inc.,
59-12 37th Ave., Woodside, NY 11377; 212-429-0500
BICC-Vero Electronics, Inc.,
171 Bridge Rd., Hauppauge, NY 11788; 516-234-0400
Belden Electronic Wire & Cable,
PO Box 1980, Richmond, IN 47375; 317-983-5200

Beman Mfg.,
PO Box 370, New Cumberland, PA 17070; 717-938-1451
Bendix Corp., Electrical Comps. Div.,
Sidney, NY 13838; 607-563-5324
Berg Electronics, DuPont Co.,
30 Hunter La., Camp Hill, PA 17011; 800-237-BERG
Bud Industries, Inc.,
4605 E. 355th St., Willoughby, OH 44094; 216-946-3200
*Bud Radio,
4605 E. 355th St., Willoughby, OH 44094; 216-946-3200
Buggie H.H./Canton Connector Corp.,
20 Wapping Rd., Kingston, MA 02364; 617-585-4315
Burndy Corporation,
Richards Ave., Norwalk, CT 06852; 203-838-4444
CTS Corporation,
905 North West Blvd., Elkart, IN 46514; 219-293-7511
*CTS Fabri-Tek, Inc., Connector Div.,
9210 Science Center Dr., Minneapolis, MN 55428; 612-533-3533
*CTS Fabri-Tek, Inc.,
6900 Shady Oak Rd., Eden Prairie, MN 55344; 612-941-9100
*Canton Connector Corp.,
Jones River Industrial Park, 20 Wapping Rd., Kingston, MA 02364; 617-585-4315
Circuit Assembly Corp.,
18 Thomas St., Irvine, CA 92714; 714-540-5490
Compac,
279 Skidmore Rd., Deer Park, NY 11729; 516-667-3933
Components Corp.,
6 Kinsey Pl., Denville, NJ 07834; 201-627-0290
Computer Cable & Products, Inc., Affil. Vertex Electronics,
147 Gazza Blvd., Farmingdale, NY 11735; 516-293-1610
Concord Electronics,
30 Great Jones St., Dept. JE, New York, NY 10012; 212-777-6571
Connector Corp.,
6025 N. Keystone Ave., Chicago, IL 60646; 312-539-3108
*Contact Electronics Inc.,
30 Plymouth St., Fairfield, NJ 07006; 201-575-7660 800-221-1451
Control Products Div., Amerace Corp.,
2330 Vauxhall Rd., Union, NJ 07083; 201-964-4400
Curtis Industries,
8000 West Tower Ave., Milwaukee, WI 53223; 414-354-1500
*Dale Electronics, Inc., Yankton Division,
East Highway 50, Box 180, Yankton, SD 57078; 605-685-9301
*DataCon, Inc.,
60 Blanchard Rd., Burlington, MA 01803; 617-273-5800
*Dataware Systems Lease, Inc.,
30 Bay St., Staten Island, NY 10301; 212-447-4911
Deutsch Co., Deutsch Fiber Optics Div.,
7001 W. Imperial Hwy., Los Angeles, CA 90045; 213-649-1400
Douglas Electronics,
718 Marina Blvd., San Leandro, CA 94577; 415-483-8770
Dynatech Corp.,
1225 E. Wakeham Ave., PO Box 1019, Dept. E, Santa Ana, CA 92702; 714-558-8755
E.F. Johnson Co.,
299 Johnson Ave., Waseca, MN 56093; 507-835-6222
Eby Co.,
2751 Southampton Rd., Philadelphia, PA 19154; 215-969-4200
Edac Inc.,
20 Railside Rd., Toronto, ON M3A 1A4, CANADA, 416-445-2292
Elco Corp., Interconnect Systems Div.,
2250 Park Pl., El Segundo, CA 90245; 213-675-3311
*Elco Corp., Electronic Connector Div.,
Huntingdon Industrial Park, Huntingdon, PA 16652; 814-643-0700

*Electronic Molding Corp.,
96 Mill St., Woonsocket, RI 02895; 401-769-3800
Electrovert Inc.,
399 Executive Blvd., Elmsford, NY 10523; 914-592-7322
Elfab Corp.,
PO Box 810555, Dallas, TX 75381; 214-233-3033 800-527-0753
*Excel Products,
401 Joyce Kilmer Ave., New Brunswick, NJ 08903; 201-249-6600
*Frequency Electronics,
55 Charles Lindburgh Blvd., Mitchell Field, NY 11553; 516-794-4500
Fujitsu America, Inc.,
918 Sherwood Dr., Lake Bluff, IL 60044; 312-295-2610
GC Electronics,
400 S. Wyman St., Rockford, IL 61101; 815-968-9661
*Garry Mfg. Co., Div. of Brand-Rex Co.,
9 Queen Anne Ct., Langhorne, PA 19047; 215-949-2300
H&T Components Inc., H&T Components Ltd.,
87 Sand Pit Rd., Danbury, CT 06810; 203-794-1798
Holmberg Electronics,
Asheville Hwy., Inman, SC 29349; 803-472-4141
*Hughes Aircraft Co., Connecting Devices Div.,
17150 Von Karman Ave., Irvine, CA 92714; 714-660-5701
*Hybricon Corp.,
410 Great Rd., Littleton, MA 01460; 617-486-3174
*Hypertronics Corp.,
16 Brent Dr., Hudson, MA 01749; 617-568-0451 800-225-9228
ITT Cannon,
10550 Talbert Ave., PO Box 8040, Fountain Valley, CA 92708; 714-964-7400
*Industrial Electronic Hardware Corp.,
109 Prince St., New York, NY 10012; 212-677-1881
Injectorall Electronics,
98-100 Glen St., Glen Cove, NY 11542; 516-671-6010
Jolo Industries,
13921 Nautilus Dr., Garden Grove, CA 92643; 714-554-6840
Kel-Am,
308 E. 5th, PO Box 313, Eldon, MO 65026; 314-392-7174
*Keystone Electronics Corp.,
49 Bleecker St., New York, NY 10012; 212-475-4600
*Kings Electronics,
40 Marbledale Rd., Tuckahoe, NY 10707; 914-793-5000
*Kulka Smith, Inc.,
1913 Atlantic Ave., Manasquan, NJ 08736; 201-223-9400
Lawrence-Crow Electronics, Inc.
2100 Stemmons, Dallas, TX 75207; 214-749-5440
Magnum Elec.,
6385 Dixie Hwy., Erie, MI 48133; 313-848-2555
Malco, Div. Microdot Connector Grp.,
12 Progress Dr., Montgomeryville, PA 18936; 215-699-5373
Masterite Corporation,
2841 Lomita Blvd., Torrance, CA 90505; 213-775-3471
Methode Electronics, Inc., Interconnect Products Div.,
1700 Hicks Rd., Rolling Meadows, IL 60008; 312-392-3500
*Methode Electronics, Inc.,
7444 W. Wilson Ave., Chicago, IL 60656; 312-867-9600
*Microtech,
1420 Conchester Hwy, Boothwyn, PA 19061; 215-459-3566
Middleburg Corp., Middco Connectors,
220 Albany Turnpike, Canton, CT 06019; 203-693-8361
Midland-Ross Corp., Cambion Div.,
One Airwife Place, Cambridge, MA 02140; 617-491-5400
*Milton Ross Co.,
511 Second St. Pike, Southampton, PA 18966; 215-355-0200

Molex,
2222 Wellington Ct., Lisle, IL 60532; 312-969-4550
Mupac,
10 Mupac Dr., Brockton, MA 02401; 617-588-6110
Mura Corp.,
177 Cantiague Rock Rd., Westbury, NY 11590; 516-935-3640
Nepenthe/Yamaichi,
2471 E. Bayshore 20, Palo Alto, CA 94303; 415-856-9332
*Omni Spectra,
21 Continental Blvd., Merrimack, NH 03054; 603-424-4111
Phoenix Contact,
1900 Greenwood St., Harrisburg, PA 17104; 717-232-0500
Positronic Industries,
423 North Campbell, Springfield, MO 65806; 417-866-2322
Pylon Company,
452 John Dietsch Blvd., Attleboro, MA 02763; 617-699-7646
RDI/Reed Devices Inc.,
525 Randy Rd., Carol Spring, IL 60188; 312-682-4100
Robinson-Nugent, Inc.,
800 E. 8th St., New Albany, IN 47150; 812-945-0211
SMK Electronics Corp., U.S.A.,
1901 Nancita Circle, Placentia, CA 92670; 714-996-0960
Schroff Inc.,
170 Commerce Dr., Warwick, RI 02886; 401-732-3770
Schroff UK Ltd.,
Maylands Ave., Hemel Hempstead, Herts, HP2 4SG, ENGLAND, 0442-40471/6
Sealectro,
225 Hoyt St., Mamaroneck, NY 10543; 914-698-5600
Security Plastics Inc.,
14427 N.W. 60th Ave., Miami Lakes, FL 33014; 305-823-5440
Souriau Inc.,
25158 Avenue Stanford, Valencia, CA 91355; 805-257-4830
Spectra-Strip,
7100 Lampson Ave., Garden Grove, CA 92642; 714-892-3361
Staffall Inc.,
7 Woodland St., Providence, RI 02908; 401-351-8282
Stanford Applied Engineering Inc.,
3520 De La Cruz Blvd., Santa Clara, CA 95050; 408-980-1600
*Star-Tron Corp.,
58 Curtis St., Providence, RI 02909; 401-274-5090
Sullins Electronics Corp.,
PO Box 189, 801 Mission Rd., San Marcos, CA 92069; 619-744-0125
Sylvania Connector Prods. Oper., GTE Products Corp.,
Box 29, Titusville, PA 16354; 814-589-7071
Sylvania Parts,
816 Lexington Ave., Warren, PA 16365; 814-723-2000 800-221-3333
Symbex Corp.,
72 Corwin Dr., Box 938, Painesville, OH 44077; 216-354-0925
Symtron Corp.,
2415 E. Charleston Rd., Mountain View, CA 94043; 415-965-4500
T&B/Ansley Corp., Sub. Thomas & Betts,
920 Route 202, Raritan, NJ 08869; 201-685-1600
*TRW Connector Div., TRW Electronic Components Grp.,
1501 Morse Ave., Elk Grove Village, IL 60007; 312-981-6000
*Tecknit (Eastern Facility),
129 Dermody St., Cranford, NJ 07016; 201-272-5500
*Teka Products,
45 Salem, Providence, RI 02907; 401-785-4110
Teledyne Kinetics,
410 S. Cedros Ave., Solana Beach, CA 92075; 619-755-1181
*Teradyne Connection Systems,
44 Simon St., Nashua, NH 03060; 603-889-5156

Teradyne Inc.,
183 Essex St., Boston, MA 02111; 617-482-2700
*Texas Instruments, Matls. & Controls Group,
34 Forest St., Attleboro, MA 02703; 617-699-3800
*Texas Instruments, Inc.,
Box 225012-MS-84, Dallas, TX 75265; 214-995-6611
*Thomas & Betts, Electronics Group Headquarters,
920 Rte. 202, Raritan, NJ 08869; 201-469-4000
Thomson-CSF Comps. Corp., Socapex Division,
6660 Variel Ave., Canoga Park, CA 91303; 213-887-0750
Underwriters Safety Device, An Allied Co.,
7300 W. Wilson Ave., Chicago, IL 60656; 312-867-4600
United Technologies, Terminal Products,
1230 Sabine St., Huntinton, IN 46750; 219-356-2700
Urban Electronics,
PO Box 456, Dover, MA 02030; 617-329-4068
*Vector Electronic Co., Inc.,
12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342; 818-365-9661
Viking Connectors,
21001 Nordhoff St., PO Box 2379, Chatsworth, CA 91311; 818-341-4330
Wago Corp.,
6657 N. Sidney Pl., Milwaukee, WI 53209; 414-352-1035
Waldom Electronics,
4301 W. 69th St., Dept. EEM, Chicago, IL 60629; 312-585-1212
*Wells Electronics,
1701 S. Main St., South Bend, IN 46613; 219-287-5941
Winslow International,
2471 E. Bayshore 20, Palo Alto, CA 94303; 415-856-0552
World Enterprises, Inc.,
550 N. Bayard Ave., Waynesboro, VA 22980; 703-942-4159

CABLE CONNECTOR SUPPLIERS

*3M-Electronic Products Division,
3M Center, Bldg. 225-1N-06, St. Paul, MN 55144; 612-733-7408
A P PRODUCTS INCORPORATED,
9450 Pineneedle Dr., Box 540, Mentor, OH 44060; 216-354-2101
AKG Acoustics, Inc.,
77 Selleck St., Stamford, CT 06902; 203-348-2121
*AMP Incorporated,
Box 3608, Harrisburg, PA 17105; 717-564-0100
AMP Products Corp.,
PO Box 1776, Paoli, PA 19301; 215-647-1000
Air Electro Supply, Inc.,
7700 Gloria Ave., Van Nuys, CA 91406; 213-873-6400 818-988-4400
*AirBorn, Inc.,
4321 AirBorn Dr., Addison, TX 75001; 214-931-3200
*Alden Products Company,
PO Box 860, 117 N. Main St., Brockton, MA 02403; 617-583-0160
Alpha Products, Inc.,
5740 Corsa Ave. 04, Westlake Village, CA 91362; 818-889-9304
American-Zettler,
16881 Hale Ave., Irvine, CA 92714; 714-660-1670
Amlan, Inc.,
97 Thornwood Rd., Stamford, CT 06903; 203-322-1913
*Armel Electronics,
1601 75th St., N. Bergen, NJ 07047; 201-869-4201
Arrow Hart Div., Cooper Industries,
103 Hawthron St., Hartford, CT 06101; 203-249-8471
Asmann Components, Div. of ebm Industries, Inc.,
525 New Britain Ave., Unionville, CT 06085; 203-674-1515

Astrolab,
345 Daiziel Rd., Linden, NJ 07036; 201-862-0022
Augat Inc.,
33 Perry Ave., Box 779, Attleboro, MA 02703; 617-222-2202
Auto-Swage Products,
726 River Rd., Shelton, CT 06484; 203-929-1401
*Automatic Connector, Inc.,
400 Moreland Rd., Commack, NY 11725; 516-543-5000
Autosplice, Inc.,
59-12 37th Ave., Woodside, NY 11377; 212-429-0500
*BIW Cable Systems, Inc.,
65 Bay St., Dorchester, MA 02125; 617-265-2102
Beau Products Div.,
Box 10, Laconia, NH 03247; 603-524-5101
*Bendix Corp., Electrical Comps. Div.,
Sidney, NY 13838; 607-563-5324
Berg Electronics, DuPont Co.,
30 Hunter La., Camp Hill, PA 17011; 800-237-BERG
*Breeze-Illinois, TransTechnology Corp.,
Main & Agard Sts., PO Box 368, Wyoming, IL 61491; 309-695-2511
Buggie H.H./Canton Connector Corp.,
20 Wapping Rd., Kingston, MA 02364; 617-585-4315
Burndy Corporation,
Richards Ave., Norwalk, CT 06852; 203-838-4444
Cambridge Products, Hi-G, Inc,
244 Woodland Ave., Bloomfield, CT 06002; 203-243-1761
*Canton Connector Corp.,
Jones River Industrial Park, 20 Wapping Rd., Kingston, MA 02364; 617-585-4315
Chabin Corp.,
890 Fortress St., Chico, CA 95926; 916-891-6410
Chatsworth Data Corp., Impact-o-Graph Div.,
20710 Lassen St., Chatsworth, CA 91311; 213-341-3000
Circuit Assembly Corp.,
18 Thomas St., Irvine, CA 92714; 714-540-5490
Component Mfg. Service, Inc,
1 Component Park, W. Bridgewater, MA 02379; 617-580-0111
Computer Cable & Products, Inc., Affil. Vertex Electronics,
147 Gazza Blvd., Farmingdale, NY 11735; 516-293-1610
Connector Corp.,
6025 N. Keystone Ave., Chicago, IL 60646; 312-539-3108
*Contact Electronics Inc.,
30 Plymouth St., Fairfield, NJ 07006; 201-575-7660 800-221-1451
Daburn Electronics & Cable,
70 Oak St., Norwood, NJ 07648; 201-768-5400
*Dataware Systems Lease, Inc.,
30 Bay Street, Staten Island, NY 10301; 212-447-4911
*E-Z-Hook, Div. Tektest Inc.,
Box 450, 225 N. Second Ave., Arcadia, CA 91006; 818-446-6175
E.F. Johnson Co.,
299 Johnson Ave., Waseca, MN 56093; 507-835-6222
Eby Co.,
2751 Southampton Rd., Philadelphia, PA 19154; 215-969-4200
Elco Corp., Electronic Connector Div.,
Huntingdon Ind'l Park, Huntingdon, PA 16652; 814-643-0700
*Electrovert Inc.,
399 Executive Blvd., Elmsford, NY 10523; 914-592-7322
Fischer-America, Inc.,
13756 Glenoaks Blvd., Sylmar, CA 91342; 818-362-9393
GC Electronics,
400 S. Wyman St., Rockford, IL 61101; 815-968-9661
*Giannini Petro Marine,
9474 Chesapeake Dr., San Diego, CA 92123; 619-569-1668

*H&T Components Inc., H&T Components Ltd.,
87 Sand Pit Rd., Danbury, CT 06810; 203-794-1798
Holmberg Electronics,
Asheville Hwy., Inman, SD 29349; 803-472-4141
*Hughes Aircraft Co., Connecting Devices Div.,
17150 Von Karman Ave., Irvine, CA 92714; 714-660-5701
Hugin Industries, Inc.,
745 Distel Dr., Los Altos, CA 94022; 415-961-2950
Hypertronics Corp.,
16 Brent Dr., Hudson, MA 01749; 617-568-0451 800-225-9228
ITT Cannon,
10550 Talbert Ave., PO Box 8040, Fountain Valley, CA 92708; 714-964-7400
ITT Pomona Electronics,
1500 E. 9th Street, PO Box 2767, Pomona, CA 91766; 714-623-3463
Ideal Industries,
4450 Becker Pl., Sycamore, IL 60178; 815-895-5181
*Industrial Electronic Hardware Corp.,
109 Prince St., New York, NY 10012; 212-677-1881
Jettron Products,
PO Box 337, E. Hanover, NJ 07936; 201-887-0571
Kel-Am,
308 E. 5th, PO Box 313, Eldon, MO 65026; 314-392-7174
*Kings Electronics,
40 Marbledale Rd., Tuckahoe, NY 10707; 914-793-5000
Kulka Smith, Inc.,
1913 Atlantic Ave., Manasquan, NJ 08736; 201-223-9400
Lemo U.S.A. Inc.,
PO Box 11006M, Santa Rosa, CA 95406; 707-578-8811
*M/A-COM Omni Spectra, Inc.,
21 Continental Blvd., Merrimack, NH 03054; 603-424-4111
*Mac Panel Co.,
Box 5027, 216 Pine St., High Point, NC 27262; 919-884-8111
Magnum Elec.,
6385 Dixie Hwy., Erie, MI 48133; 313-848-2555
Malco, Div. Microdot Connector Grp.,
12 Progress Dr., Montgomeryville, PA 18936; 215-699-5373
Maury Microwave,
8610 Helms Ave., Cucamonga, CA 91730; 714-987-4715
Metuchen Capacitors, Inc.,
420 Park Ave., Perth Amboy, NJ 08861; 201-442-0500
*Micro Mode Products,
1870 John Towers Ave., El Cajon, CA 92020; 619-449-3844
*Microtech,
1420 Conchester Hwy., Boothwyn, PA 19061; 215-459-3566
Middleburg Corp., Middco Connectors,
220 Albany Turnpike, Canton, CT 06019; 203-693-8361
Midway Mfr. Co.,
10750 W. Grand Ave., Franklin Park, IL 60131; 312-451-1360
Molex,
2222 Wellington Ct., Lisle, IL 60532; 312-969-4550
Mupac,
10 Mupac Dr., Brockton, MA 02401; 617-588-6110
Mura Corp.,
177 Cantiague Rock Rd., Westbury, NY 11590; 516-935-3640
*Narda Microwave Corp.,
435 Moreland Rd., Hauppauge, NY 11788; 516-231-1700
National Tel-Tronics,
State Road Hill, Meadville, PA 16335; 814-724-6440
National Electric Cable,
16566 S.W. 72nd Ave., Portland, OR 97223; 503-620-9400
Neutrik Products,
77 Selleck St., Stamford, CT 06902; 203-348-2121

Nichifu America, Inc.,
1494 N. Charlotte St., Pottstown, PA 19464; 215-323-7120
Olympic Wire & Cable,
1 Madison Rd., Fairfield, NJ 07006; 201-227-7996
*Omni Spectra,
21 Continental Blvd., Merrimack, NH 03054; 603-424-4111
Pacific Electricord,
747 W. Redondo Beach Blvd., Gardena, CA 90247; 213-532-6600
*Panduit Corp.,
17301 Ridgeland Ave., Tinley Park, IL 60477; 312-532-1800
Phoenix Contact,
1900 Greenwood St., Harrisburg, PA 17104; 717-232-0500
*Positronic Industries,
423 North Campbell, Springfield, MO 65806; 417-866-2322
Power Dynamics,
177 Valley, S. Orange, NJ 07079; 201-762-6886
Raychem Corporation, Electronics Group,
300 Constitution Dr., Menlo Park, CA 94025; 415-361-3860
Robinson-Nugent, Inc.,
800 E. 8th St., New Albany, IN 47150; 812-945-0211
*Ronor Systems,
145 N. Plains Ind. Park Rd., Wallingford, CT 06492; 203-265-2110
*Rowe Industries, Inc.,
6225 Benore Rd., PO Box 6877, Toledo, OH 43612; 419-729-9761
Rye Industries, Inc.,
125 Spencer Pl., PO Box M, Mamaroneck, NY 10543; 914-698-0080
SAMTEC,
810 Progress Blvd., PO Box 1147, New Albany, IN 47150; 812-944-6733
Sabritec,
16631 Noyes Ave., Irvine, CA 92714; 714-549-7350
*Sealectro,
225 Hoyt St., Mamaroneck, NY 10543; 914-698-5600
Security Plastics Inc.,
14427 N.W. 60th Ave., Miami Lakes, FL 33014; 305-823-5440
Shogyo International Corp.,
287 Northern Blvd., Great Neck, NY 11021; 516-466-0911
Shokai Far East Ltd.,
280 North Central Ave., Hartsdale, NY 10530; 914-681-0700
*Solitron/Microwave,
Box 278, Port Salerno, FL 33492; 305-287-5000
Spectrum Control, Inc.,
2185 W. 8th St., Erie, PA 16505; 814-455-0966
Square D Co.,
Executive Plaza, Palatine, IL 60067; 312-397-2600
Stanford Applied Engineering Inc.,
3520 De La Cruz Blvd., Santa Clara, CA 95050; 408-980-1600
*Star-Tron Corp.,
58 Curtis St., Providence, RI 02909; 401-274-5090
*Superior Electric Co.,
383 Middle St., Bristol, CT 06010; 203-582-9561
Support Systems International Corp.,
150 South Second St., Richmond, CA 94804; 415-234-9090
Switchcraft, Inc.,
5555 N. Elston, Chicago, IL 60630; 312-792-2700
Symbex Corp.,
72 Corwin Dr., Box 938, Painesville, OH 44077; 216-354-0925
Symtron Corp.,
2415 E. Charleston Rd., Mountain View, CA 94043; 415-965-4500
*TRW Connector Div., TRW Electronic Components Grp.,
1501 Morse Ave., Elk Grove Village, IL 60007; 312-981-6000
TRW Cylindrical Connector Div., TRW Electronic Components Group,
8821 Science Center Dr., Minneapolis, MN 55428; 612-537-1010

*Texas Instruments, Matls. & Controls Group,
34 Forest St., Attleboro, MA 02703; 617-699-3800
*Thomas & Betts, Electronics Group Headquarters,
920 Rte. 202, Raritan, NJ 08869; 201-469-4000
Thomson-CSF Comps. Corp., Socapex Division,
6660 Variel Ave., Canoga Park, CA 91303; 213-887-0750
*Trompeter Electronics, Inc.,
8936 Comanche, Chatsworth, CA 91311; 818-882-1020
Uniform Tubes,
Collegeville, PA 19426; 215-539-0700
Viking Connectors,
21001 Nordhoff St., PO Box 2379, Chatsworth, CA 91311; 818-341-4330
Waldom Electronics,
4301 W. 69th St., Dept. EEM, Chicago, IL 60629; 312-585-1212
Weidmuller Terminations,
821 Southlake Blvd., Richmond, VA 23236; 804-794-2877

SUBMINIATURE CONNECTOR SUPPLIERS

*3M-Electronic Products Division,
3M Center, Bldg. 225-1N-06, St. Paul, MN 55144; 612-733-7408
*AMP Incorporated,
Box 3608, Harrisburg, PA 17105; 717-564-0100
*AMP Products Corp.,
PO Box 1776, Paoli, PA 19301; 215-647-1000
Accessories for Electronics, Inc.,
800 Merrick Rd., Baldwin, NY 11510; 516-546-1751
Air Electro Supply, Inc.,
7700 Gloria Ave., Van Nuys, CA 91406; 213-873-6400 818-988-4400
Alpha Products, Inc.,
5740 Corsa Ave. 04, Westlake Village, CA 91362; 818-889-9304
Alpha Wire Corp.,
711 Lidgerwood Ave., PO Box 711, Elizabeth, NJ 07207; 201-925-8000
American-Zettler,
16881 Hale Ave., Irvine, CA 92714; 714-660-1670
Amlan, Inc.,
97 Thornwood Rd., Stamford, CT 06903; 203-322-1913
Aptronics Corporation,
9450 Pineneedle Dr., PO Box 270, Mentor, OH 44060; 216-354-9239
Aries Electronics,
Box 130, Frenchtown, NJ 08825; 201-996-6841
Asmann Components, Div. of ebm Industries, Inc.,
525 New Britain Ave., Unionville, CT 06085; 203-674-1515
Belden Electronic Wire & Cable,
PO Box 1980, Richmond, IN 47375; 317-983-5200
Beman Mfg.,
PO Box 370, New Cumberland, PA 17070; 717-938-1451
Berg Electronics, DuPont Co.,
30 Hunter La., Camp Hill, PA 17011; 800-237-BERG
*CTS Fabri-Tek, Inc., Connector Div.,
9210 Science Center Dr., Minneapolis, MN 55428; 612-533-3533
CTS Fabri-Tek, Inc.,
6900 Shady Oak Rd., Eden Prairie, MN 55344; 612-941-9100
Component Mfg. Service, Inc.,
1 Component Park, W. Bridgewater, MA 02379; 617-580-0111
Computer Cable & Products, Inc., Affil. Vertex Electronics,
147 Gazza Blvd., Farmingdale, NY 11735; 516-293-1610
*Contact Electronics Inc.,
30 Plymouth St., Fairfield, NJ 07006; 201-575-7660 800-221-1451
*Dataware Systems Lease, Inc.,
30 Bay Street, Staten Island, NY 10301; 212-447-4911

ebm Industries, Inc.,
525 New Britain Ave., Unionville, CT 06085; 203-674-1515
Eby Co.,
2751 Southampton Rd., Philadelphia, PA 19154; 215-969-4200
Elfab Corp.,
PO Box 810555, Dallas, TX 75381; 214-233-3033 800-527-0753
Ercona,
2492 Merrick Rd., Bellmore, NY 11710; 516-781-2770
Erni Comps. Corp., Erni Elektroapparate GMBH,
1235 Davis St., Arlington Heights, IL 60005; 312-577-8620
Fujitsu America, Inc.,
918 Sherwood Dr., Lake Bluff, IL 60044; 312-295-2610
GC Electronics,
400 S. Wyman St., Rockford, IL 61101; 815-968-9661
H&T Components, Inc., H&T Components Ltd.,
87 Sand Pit Rd., Danbury, CT 06810; 203-794-1798
Holmberg Electronics,
Asheville Hwy., Inman, SD 29349; 803-472-4141
ITT Cannon,
10550 Talbert Ave., PO Box 8040, Fountain Valley, CA 92708; 714-964-7400
Injectorall Electronics,
98-100 Glen St., Glen Cove, NY 11542; 516-671-6010
L-Com Inc.,
1755 Osgood St., Unit 11EM, N. Andover, MA 01845; 617-682-6936
Lawrence-Crow Electronics, Inc.
2100 Stemmons, Dallas, TX 75207; 214-749-5440
Lemo U.S.A. Inc.,
PO Box 11006M, Santa Rosa, CA 95406; 707-578-8811
Malco, Div. Microdot Connector Grp.,
12 Progress Dr., Montgomeryville, PA 18936; 215-699-5373
Metuchen Capacitors, Inc.,
420 Park Ave., Perth Amboy, NJ 08861; 201-442-0500
Middleburg Corp., Middco Connectors,
220 Albany Turnpike, Canton, CT 06019; 203-693-8361
Min-E-Con,
17815 F Sky Park Blvd., Irvine, CA 92714; 714-250-0474
Molex,
2222 Wellington Ct., Lisle, IL 60532; 312-969-4550
Mura Corp.,
177 Cantiague Rock Rd., Westbury, NY 11590; 516-935-3640
Murata Erie North America, Inc.,
1148 Franklin Rd., S.E., Marietta, GA 30067; 404-952-9777
Neutrik Products,
77 Selleck St., Stamford, CT 06902; 203-348-2121
Olympic Wire & Cable,
1 Madison Rd., Fairfield, NJ 07006; 201-227-7996
Pacific Electricord,
747 W. Redondo Beach Blvd., Gardena, CA 90247; 213-532-6600
Robinson-Nugent, Inc.,
800 E. 8th St., New Albany, IN 47150; 812-945-0211
Rowe Industries, Inc.,
6225 Benore Rd., PO Box 6877, Toledo, OH 43612; 419-729-9761
Sabritec,
16631 Noyes Ave., Irvine, CA 92714; 714-549-7350
Schroff UK Ltd.,
Maylands Ave., Hemel Hempstead, Herts, HP2 4SG, ENGLAND, 0442-40471/6
Security Plastics Inc.,
14427 N.W. 60th Ave., Miami Lakes, FL 33014; 305-823-5440
*Souriau Inc.,
25158 Avenue Stanford, Valencia, CA 91355; 805-257-4830
Spectra-Strip,
7100 Lampson Ave., Garden Grove, CA 92642; 714-892-3361

Spectrum Control, Inc.,
2185 W. 8th St., Erie, PA 16505; 814-455-0966
Stanford Applied Engineering Inc.,
3520 De La Cruz Blvd., Santa Clara, CA 95050; 408-980-1600
Support Systems International Corp.,
150 South Second St., Richmond, CA 94804; 415-234-9090
Symbex Corp.,
72 Corwin Dr., Box 938, Painesville, OH 44077; 216-354-0925
Symtron Corp.,
2415 E. Charleston Rd., Mountain View, CA 94043; 415-965-4500
*TRW Connector Div., TRW Electronic Components Grp.,
1501 Morse Ave., Elk Grove Village, IL 60007; 312-981-6000
Terminal Data Corp.,
11878 Coakley Circle, Rockville, MD 20852; 301-881-7655
*Thomas & Betts, Electronics Group Headquarters,
920 Rte. 202, Raritan, NJ 08869; 201-469-4000
U.S. Terminals,
7502 Camargo Rd., Cincinnati, OH 45243; 513-561-8145
*Vector Electronic Co., Inc.,
12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342; 818-365-9661
Viking Connectors,
21001 Nordhoff St., PO Box 2379, Chatsworth, CA 91311; 818-341-4330
*Wells Electronics,
1701 S. Main St., South Bend, IN 46613; 219-287-5941